

A MONOGRAPH
OF THE
CULICIDÆ
MOSQUITOES.

MAINLY COMPILED FROM THE COLLECTIONS RECEIVED AT
THE BRITISH MUSEUM
FROM VARIOUS PARTS OF THE WORLD
IN CONNECTION WITH
THE INVESTIGATION INTO THE CAUSE OF MALARIA
CONDUCTED BY THE COLONIAL OFFICE
AND THE ROYAL SOCIETY.

BY

FRED. V. THEOBALD, MA.,

FOREIGN MEMBER OF THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS,
WASHINGTON, U.S.A.; ZOOLOGIST TO THE SOUTH-EASTERN
AGRICULTURAL COLLEGE, ETC.

*Author of "A Text-Book of Agricultural Zoology,"
"The Parasitic Diseases of Poultry," etc.*

VOL. III.

LONDON:

PRINTED BY ORDER OF THE TRUSTEES.

SOLD BY

LONGMANS & CO., 39, PATERNOSTER ROW, E.C.; B. QUARITCH, 15,
PICCADILLY, W.; DULAU & CO., 37, SOHO SQUARE, W.; KEGAN PAUL,
TRENCH, TRÜBNER & CO., CHANCING CROSS ROAD, W.C.;

AND AT THE

BRITISH MUSEUM (NATURAL HISTORY), CROMWELL ROAD, S.W.

1903.

(All rights reserved.)

LONDON:
PRINTED BY WILLIAM CLOWES AND SONS, LIMITED,
DURK STREET, STAMFORD STREET, S.E., AND GREAT WINDMILL STREET, W.

19005

PREFACE.

Owing to the large number of collections of *Culicidae* received at the Museum since the appearance of the first two volumes of this monograph in November, 1901, and the frequent enquiries for the names of the mosquitoes sent by medical men, the Trustees have decided to issue a further volume of this work.

Between April, 1901, and February, 1903, over a hundred collections have been received. Many of these are of considerable extent, but were found to contain much material that had been previously described. Amongst them, however, were eighty eight new species, eight new varieties, and several species of which one sex only had been described. Several old species that have not been recorded since the original descriptions were drawn up have also been re-described from this fresh material, and a few species described by other authors are also incorporated so as to make the work complete.

Since the last recorded collection (p. 352) was received, about twenty five further consignments have arrived, which also contain many new species. These will be described in Journals, as it is not proposed to issue another volume until the arrival of new species considerably slackens and the subject has reached a more final stage. Coloured plates have been dispensed with, and I have confined the illustration to the text and collotype plates of the wings and scales.

This group has yet a further importance attached to it than when the first volumes went to press, owing to the proved connection between the genus *Stegomyia* described in Vol. I., p. 283, and Yellow Fever.

Bearing in mind the not far distant opening of the Panama

Canal and the consequent direct and rapid communication between the Yellow Fever districts and the East and Australian Colonies, it is most essential that all possible information be collected regarding the genus *Stegomyia* and distribution.

I shall still be glad to receive further collections and notes, and also suggestions regarding this and the preceding volumes.

E. RAY LANKESTER.

BRITISH MUSEUM (NATURAL HISTORY),
CROMWELL ROAD, LONDON, S.W.

June 27th, 1903.

INTRODUCTION.

SINCE the publication of the "Monograph of Culicidae," in 1901, a considerable amount of fresh material has been received from different parts of the world. Not only have the adults been sent, but in many instances the life history has been worked out by observers living in the countries whence the insects have come. Much of this material still remains to be described.

No new terms have been employed in the present descriptions, the species are treated in exactly the same way as in the two preceding volumes. A suggestion, however, has been made to me by Capt. Liston that the tarsal joints should be called tarsal segments. This certainly is more accurate.

The importance of the scale structure upon which the classification of the *Culicidae* was mainly based has been generally recognised, and it may safely be said that it is the only character by which we can arrive at any satisfactory classification. These characters have been worked out more fully amongst the *Anopheleina*, *Culicina*, and *Aedeomyiina*. The large cumbersome genus *Culex* has thus been still further reduced, and the old genus *Anopheles* split up into several genera. There is quite as much structural difference between a true *Anopheles*, such as the generic type *Anopheles maculipennis* and the scaly *Cellia Pharoensis*, as between *Culex* and *Anopheles*; the same applies to the new genera of the *Culicina* and *Aedeomyiina*. With the *Anopheleina* the scale structure typical of each new genus differs on body, thorax, and to some extent the wings, but in the *Culicina* the chief differences in the new genera lie mainly in the form of the wing scales, and also, but to a less extent, in the *Aedeomyiina*. M. Neveu Lemaire has formulated a classification mainly based on the palpal jointing, but as the joints are not recognisable in ordinary specimens there is strong objection to this method of classification. Further mention is made of this subject (p. 6).

Important specific larval characters have now been worked out on a small scale. In the larvae of the *Anopheles* we find constant characters in the so called "frontal hairs," in the stellate palmate organs of the dorsum, and in the structure of the antennae. But with the exception of the Indian, a few African, and the European species, little is known of the larval characters. Drs. Christophers and Stephens have worked out the larval structures for most of the Indian species, and have shown the differences also in the eggs. Some species in the adult stage are almost inseparable, yet an examination of the scales will reveal the difference. The characters of the genitalia are not so marked; many allied species have the claspers almost exactly alike. But in the *Culiseta* there is great variation in the male sexual appendages.

Since the last volumes were issued, we have found that some *Anopheles* have a wide distribution—*e.g.*, adults of a species from Africa (*Nyssorhynchus maculipalpis*) are the same as some sent from India.

In many respects the *Culicidae* are extremely variable; this variation is chiefly in wing markings, and to some extent in the leg banding in certain species. The variation in wing-markings is said to be seasonal. The difference in position of the cross veins in the same species has been demonstrated by observers in India (p. 5), and by the examination of the large amount of material recently received at the Museum, but this is certainly only in some species, others have the cross veins fixed in one position.

Drs. Christophers and Stephens, and Capts. Liston and James, I.M.S., have laid particular stress on the palpal markings as being of specific importance. There is no doubt that the number and position of the pale bands on the palpi are extremely useful in hastily identifying a specimen, but these bands are only colour effects, and specific distinctions cannot be based on such; moreover, specimens may frequently be met with showing variation in this respect. These characters have all been pointed out in the following pages.

A great deal of the new material in this volume has come from South America, Africa, and the West Indies, mainly collected by Dr. Lutz, Professor Goeldi, Drs. Fajardo, Durham, Low, Grabham, Bancroft, Moffat, and St. George Gray. My thanks must be expressed to all these and other gentlemen for their kindly help, especially to Dr. Lutz, who has worked so assiduously at the life-history of the various species in Brazil.

Considerable advance has been made in the North and Central African *Calicidae* through the work and courtesy of Drs. Sergent and Billet, who have sent in valuable material from Algeria and the Sahara region. Major Ronald Ross, C.B., Capt. Lyle Cummins, R.A.M.C., Dr. Keatinge, and others have also sent Egyptian material.

We still lack specimens from the Pacific coast of North and South America, from the East Indies, and from many of our oceanic islands. Lieut.-Col. David Bruce, F.R.S., R.A.M.C., has obtained interesting collections through the medium of the Army Medical Department.

Most unsatisfactory of all are the European species. A great number have been described, many of which are probably the same species. Very little European material has been examined; but when any fresh material is forwarded, it is usually composed of one or two common species.

Some advance has been made in connection with the East Indian *Anopheles* by Dr. Donitz, who has recently issued a paper describing eight new *Anopheles*, several of which cannot, however, be considered valid species. The material seems to have been mainly preserved in spirit.

I must here express my thanks to the many correspondents in all parts of the world of many nationalities for the help they continue to give in connection with this work.

To Professor Blanchard I am greatly indebted for helping me in the nomenclature.

The illustrations have been prepared as before with great care by Miss C. Beard and Mr. W. H. Hammond.

FRED. V. THEOBALD.

April 4th, 1903.

LIST OF ILLUSTRATIONS IN VOL. III.

FIG.

1. Squamose characters of *Anophelina*, p. 11.
2. Ova of *Anophelina*, p. 15.
3. Wing of *Anopheles maculipennis* (♂), from Crete, p. 17.
4. Frontal hairs of larval *Anophelina*, p. 18.
5. Cross-veins of *Anopheles Algeriensis* and *A. bifurcatus*, p. 20.
6. Wing of *Anopheles bifurcatus* (♂), p. 20.
7. Wing of *Anopheles bifurcatus* (♀), Crete, p. 20.
8. *Anopheles Algeriensis* (♂). (Head, etc.) p. 21.
9. Wing of *Anopheles Algeriensis* (♀), p. 21.
10. Wing scales of *Anopheles Atkinsoni*, p. 22.
11. Palpi and proboscis of *Myzomyia albirestris*, p. 23.
12. *Myzomyia finesta* and *Myzomyia Listoni*, p. 27.
13. Wing of *Myzomyia Listoni* (♂), p. 28.
14. Wing of *Myzomyia aconita* (♂), p. 31.
15. Wing of *A. (Myzomyia) hebes* (♂), p. 33.
16. Costal markings and ♀ palpi of *Anophelina* (diagrammatic), p. 36.
17. Frontal hairs of *Anopheles* larvae, p. 40.
18. Frontal hairs, palmate hairs, and ova of *Pyretophorus Jeyponensis* and *Myzomyia calicivacies*, p. 41.
19. Female palp of *Myzomyia Rossi* and *Myzomyia Ludlowi*, p. 42.
20. Wing of *Myzomyia Ludlowi* (♂), p. 43.
21. *M. Ludlowi*, showing variation in wing markings and in cross-veins, p. 43.
22. First three costal spots of *M. Ludlowi*, n. sp., and *M. Rossi*, Giles, p. 44.
23. Wing of *Myzomyia Rossi* (♀), Giles, p. 45.
24. Frontal hairs of larva of *M. Rossi*, p. 46.
25. Palmate hairs of *Anopheles* larvae, p. 47.
26. Palpi of *Myzomyia Hispaniola* and *Myzomyia Türkchudi*, p. 49.
27. Wing of *Myzomyia Hispaniola*, p. 50.
28. Wing scales and cross-veins of *M. elegans*, p. 52.
29. Wing of *Myzomyia elegans*, p. 53.
30. Wing of *Anopheles leucophyrus* (♂), J., 53.
31. Wing of *Anopheles impunctus* (♀), p. 54.
32. Wing of *Cyclolepteron Grabhami* (♀), p. 56.
33. Egg-case of *Cyclolepteron Grabhami*, p. 57.
34. *Cyclolepteron Grabhami*. Thoracic and abdominal ornamentation of larva, p. 58.

FIG.

35. Palmate hair of larva (*C. Grabhamii*), p. 58.
36. *Cycloleppterion Grabhamii*. (Antenna, frontal hairs and frontal thoracic hairs of larva.) p. 59.
37. Wing of ♂ and ♀ *Cycloleppterion mediopunctatus*, and ♀ *Arribalzagia maculipes*, p. 61.
38. *Stethomyia nimba*, p. 63.
39. *Stethomyia nimba*. (Fore and mid unguis of ♂.) p. 65.
40. *Stethomyia nimba*. (♂ genitalia.) p. 65.
41. ♂ palp of *Stethomyia nimba*, p. 65.
42. *Pyrethrophorus Jeyporensis*. (♂ palp.) p. 6.
43. *Pyrethrophorus Chaudoyei*, p. 68.
44. Wing of *Pyrethrophorus Chaudoyei* (♀), p. 69.
45. *Pyrethrophorus Chaudoyei* (♀), to show variation in wing spots, p. 70.
46. Head and thorax of *P. Palestinensis*, p. 71.
47. *P. Palestinensis* (♀). (Two variations in wing markings.) p. 72.
48. *P. Palestinensis*. (♂ genitalia.) p. 73.
49. Wing of *P. costalis* (♀), p. 75.
50. Wing of *Pyrethrophorus* (?) *merus* (♀), p. 79.
51. *Arribalzagia maculipes* (♀) and *Cycloleppterion mediopunctatus* (♀), p. 83.
52. Wing of *Myzorhynchus umbrosus* (♀), p. 87.
53. Palp of ♂ *M. sinensis*, p. 89.
54. Variations in wing markings of *Nyssorhynchus Stephensi* (♀).
55. Wing of *N. Stephensi* (♀), p. 95.
56. *Nyssorhynchus maculipalpis*, Giles. (Base of ♀ antenna; ♀ palp and cross-veins.) p. 97.
57. Frontal hairs of *N. maculipalpis*, p. 98.
58. Antenna and frontal hairs of larval *N. Pretoriensis*, p. 100.
59. ♀ palpi of *N. maculatus*, Theobald, and *N. Willmori*, James, p. 101.
60. *Nyssorhynchus Willmori*, p. 101.
61. Wing of *Nyssorhynchus Willmori* (♀), p. 103.
62. *Nyssorhynchus annulipes*. (Frontal hairs and antenna of larva.) p. 104.
63. Wing of *Nyssorhynchus* (?) *deceptor* (♀).
64. Wing of *Cellia pulcherrima* (♀), p. 109.
65. Larval characters of *Nyssorhynchus albipes*, p. 111.
66. *Megarhinus trichopygus*, Wiedemann, p. 115.
67. Larva and pupa of *Toxorhynchites immisericors*, Walker, p. 118.
68. Larva of *Toxorhynchites speciosus*, Skuse, p. 120.
69. *Toxorhynchites Marshallii*. (♂ palp and base of antenna.) p. 121.
70. *Janthinosoma Lutzii*, Theo., and *J. discrucians*, Wlk. (Fore unguis of ♀ and hind tarsi.) p. 127.
71. *Janthinosoma Arribalzagae*, Giles. (Abdominal ornamentation and hind leg of ♀.) p. 129.
72. Head of adult larva of *Mucidus alternans*, Westwood, p. 132.
73. *Mucidus alternans*, Westwood. (i, Head of young larva, and, ii, Respiratory siphon of larva.) p. 133.
74. *Mucidus alternans*, Westwood. (Pupa.) p. 133.
75. Mid unguis of ♂ *Desvoidia obturbans*, Walker; *D. fusca*, n. sp.; ♂ palp of *D. panalectros*, Giles, and of *D. fusca*. n. sp. p. 136.

FIG.

76. Pupa of *Desvoidea fusca*.
77. *Desvoidea obturbans*, Wlk. (♂ palp.) p. 138.
78. *Desvoidea obturbans*, Wlk. (♂ clasper.) p. 138.
79. Wing of *Stegomyia nigricephala* (♀). n. sp. p. 147.
80. *Theobaldia annulata*, Meigen. (♀ genital clasper.) p. 149.
81. Larva and pupa of *Theobaldia annulata*, Meigen, p. 150.
82. Wing of *Theobaldia incidens* (♀), Thomson, p. 152.
83. ♂ palpi of (a) *Theobaldia annulata*, (b) *T. spathipalpis*, and (c), *T. incidens*, p. 153.
84. Wing of *Lutzia Bigotii* (♀), Bellardi, p. 156.
85. Larva of *Culex mimeticus*, Noe, p. 157.
86. *Culex nocturnus*. n. sp. (Head and abdominal ornamentation.) p. 159.
87. Wing of *Culex nocturnus* (♀). n. sp. p. 160.
88. Wing of *Culex annulioris* (♂), Theobald, p. 163.
89. *Culex Transvaalensis*, Theobald. (Abdomen of ♀ and ♀ palp.) p. 165.
90. *Culex alis*. (♂ palp.) p. 168.
91. Wing of *Culex thalassius* (♀). n. sp. p. 169.
92. *Culex apicalis*. n. sp. (♂ palp.) p. 172.
93. Mesothorax of *Culex corniger*. n. sp. p. 173.
94. *Culex imitator*. n. sp. (♂ unguis and thoracic ornamentation.) p. 176.
95. Wing of *Culex quasigelidus* (♀.) n. sp. p. 182.
96. Wing of *Culex janitor* (♀). n. sp. p. 184.
97. Apex of ♂ palp of *Culex janitor* and *C. secutor*, Theobald, p. 184.
98. Wing of *Culex Theileri* (♀). n. sp. p. 188.
99. Wing of *Culex creticus* (♀). n. sp. p. 190.
100. *Culex palus*. n. sp. (Fore and mid unguis of ♂.) p. 195.
101. Head of *Culex Azoriensis* and *C. varioannulatus*, p. 198.
102. *Culex varioannulatus* (♀), p. 199.
103. *Culex nigrifolius*, Zetterstedt. (♂ genitalia.) Crete. p. 201.
104. *Culex cylindricus* (♀). n. sp. (Wing scales.) p. 203.
105. Wing of *Culex cylindricus* (♀). n. sp. p. 203.
106. *Culex cylindricus* (♂). (palp and proboscis.) p. 204.
107. *Culex cylindricus*. n. sp. (♂ genitalia and fore, mid and hind unguis.) p. 204.
108. *Culex nubilus*. n. sp. (♀.) (Base of antennae and fore unguis.) p. 208.
109. Wing of *Culex crinifer* (♀). n. sp. p. 210.
110. Wing of *Culex Azoriensis* (♀). n. sp. p. 211.
111. Wing of *Culex viridis* (♀). n. sp. p. 212.
112. *Culex viridis*. n. sp. (♂ genitalia.) p. 213.
113. Head of *Culex Cumminsii* (♀). n. sp. p. 215.
114. Wing of *Culex Cumminsii* (♀). p. 215.
115. *Culex Sergeantii*. n. sp. (Cephalic ornamentation and basal segments of abdomen.) p. 219.
116. *Culex ocellatus*. n. sp. (Thoracic, cephalic, and abdominal ornamentation.) p. 222.
117. Wing of *Culex ocellatus* (♀). n. sp. p. 223.
118. Caudal end of larva of *Culex fatigans*. sub-sp. *Skusii*, Giles. p. 226.

FIG.

119. Antenna of larva of *C. fatigans*. sub-sp. *Skusii*. p. 227.
- 120^c. *Culex tigripes*, Grandpré. (Abdominal and thoracic hairs of larva.) p. 228.
121. *Culex tigripes*, Grandpré. (Posterior extremity of larva.) p. 229.
122. Pupal structures in *Culex tigripes*, p. 230.
123. Wing of *Gilesia aculeata* (♀). n. sp. p. 235.
124. *Lasioconops poicilipes*. n. sp. (♀.) (Side view of abdomen, lateral abdominal scales, and cross-veins.) p. 236.
125. *Melanoconion indecorabilis* (♀). n. sp. (Two wings to show variation in stems of fork-cells.) p. 241.
126. Thorax of *Melanoconion spissipes*. n. sp. p. 242.
127. *Grabhamia Jamaicensis*, Theobald. (♂ genitalia and one clasper.) p. 244.
128. Wing of *Grabhamia Jamaicensis* (♀), Theobald, p. 245.
129. Wing of *Grabhamia Durbanensis* (♀). n. sp. p. 247.
130. Wing of *Grabhamia sollicitans* (♀), Walker, p. 248.
131. Larva of *Culex pipiens* and larva of *Grabhamia dorsalis*. p. 251.
132. *Acartomyia Zammitii*. n. sp. p. 253.
133. Wing of *Acartomyia Zammitii*. n. sp. (♀.) p. 254.
134. Larva and pupa of *Acartomyia Zammitii*. n. sp. (Structural.) p. 256.
135. *Taeniorhynchus fulvus*. (♀ palp.) p. 258.
136. Wing of *Taeniorhynchus tenax* (♀), Theobald, p. 259.
137. *Taeniorhynchus confinnis*, Arribalzaga. (♀ palp, wing scales and thoracic ornamentation.) p. 260.
138. Wing of *Taeniorhynchus confinnis* (♀), Arribalzaga, p. 261.
139. *Taeniorhynchus Arribalzagae*. n. sp. (Wing scales, wing hairs and body scales.) p. 263.
140. Scutellum of *Taeniorhynchus ochraceus*. n. sp. p. 264.
141. Wing of *Taeniorhynchus fuscopennatus* (♀). n. sp. p. 266.
142. *Taeniorhynchus fuscopennatus*. (♂ genitalia.) p. 267.
143. Wing of *Taeniorhynchus fuscopennatus* (♂). n. sp. p. 267.
144. Pupa of *Mansonia uniformis*, Theobald, p. 270.
145. *Mansonia major*. n. sp. (Head scales.) p. 271.
146. Wing of *Mansonia major* (♀). n. sp. p. 272.
147. Wing scales of *Mansonia major*. n. sp. p. 272.
148. External sexual apparatus of *Deinocerites cancer* (♀), Theobald, p. 276.
149. Wing of *Deinocerites cancer* (♀), Theobald, p. 277.
150. Wing of *Deinocerites cancer* (♂), Theobald, p. 278.
151. Male genitalia of *Deinocerites cancer*, Theobald, p. 278.
152. *Deinocerites cancer*, Theobald. (Anal extremity and frontal hairs of larva.) p. 280.
153. Thoracic segments of larva of *Deinocerites cancer*, p. 280.
154. *Deinocerites cancer*, Theobald. (Siphons of the pupa.) p. 281.
155. Genus *Finlaya*. nov. gen. (*F. poicilia*; cephalic, scutellar and abdominal squamose armature.) p. 282.
156. Wing scales of genus *Finlaya*, p. 284.
157. *Skusea funerea*; *Aedes fuscus*; *Howardina Walkeri*; *Verrallina Butleri*. (Palps and wing scales.) p. 285.
158. Head of *Howardina Walkeri* (♀), Theobald, p. 287.

FIG.

159. *Howardina Walkeri*, Theobald. (Thorax.) p. 288.
160. Head of *Howardina Greenii*. n. sp. p. 289.
161. *Howardina Greenii* (♀). n. sp. (Wing.) p. 290.
162. Wing of *Aedimorphus domesticus* (♀), Theobald, p. 291.
163. Ova of *Skusea multiplex* (?), p. 291.
164. *Skusea funerea*. n. sp. (Head and abdomen.) p. 292.
165. *Skusea multiplex*. n. sp. (Head and fore unguis of ♀.) p. 293.
166. Wing of *Uranotaenia apicalis* (♀). n. sp. p. 299.
167. *Uranotaenia pallidoventer*. n. sp. (Wing scales and flat scale on wing.) p. 300.
168. Wing of *Uranotaenia caeruleocephala* (♀), Theobald. p. 302.
169. *Uranotaenia annulata* (♀), Theobald. (Showing slight variation in venation.) p. 303.
170. *Mimomyia splendens*. (Head, scutellum and mesothoracic scales.) p. 305.
171. *Haemagogus albomaculatus*. n. sp. (Scutellum and part of abdomen.) p. 309.
172. Wing of *Phoniomyia longirostris* (♂), Theobald, p. 312.
173. Wing of *Phoniomyia longirostris* (♀), Theobald, p. 312.
174. *Dendromyia ulocoma*. n. sp. (Fore unguis and thoracic scales.) p. 314.
175. Wings of *Dendromyia ulocoma* (♀). n. sp., p. 314.
176. *Dendromyia Paraensis*. n. sp. (Head and varieties of wing scales.) p. 316.
177. Wing of *Dendromyia luteoventralis* (♀), p. 318.
178. *Runchomyia frontosa* (♀). n. sp. (Head, palp and unguis.) p. 320.
179. Wing of *R. frontosa* (♀). n. sp. p. 321.
180. Head of ♀ *Sabethes* and portion of ♂ and ♀ antennae, p. 322.
181. Wing of female *Sabethes*, p. 322.
182. *Sabethes remipes* (♀). (Apex of abdomen.) p. 323.
183. *Sabethes remipes* (♂). (Proboscis and palp.) p. 324.
184. *Sabethes remipes*. (Fore, mid and hind unguis of ♂.) p. 324.
185. Wing of *Sabethes remipes* (♂), p. 325.
186. Wing of *Sabethes remipes* (♀), Wiedemann, p. 326.
187. *Sabethoides confusus*. n. sp. (Head and prothoracic lobes and abdomen.) p. 329.
188. *Goeldia fluviatilis* (♀), Theobald. (Prothoracic lobes and metanotum.) p. 332.
189. Proboscis of ♂ *Limatus Durhamii*, Theobald, p. 333.
190. Head of larva of *Joblotia nivipes*, Theobald, p. 335.
191. Anal end of larva of *Joblotia nivipes*, Theobald, p. 335.
192. Wing of *Heptaphlebomyia simplex* (♀). n. sp. p. 336.
193. ♀ palp of *H. simplex*. n. sp. p. 337.

LIST OF PLATES.

PLATE I.—WINGS OF ANOPHELINEA.

- (i) *Pyretophorus cinereus* (♂). Theob.
- (ii) *Pyretophorus cinereus* (♀). Theob.
- (iii) *Myzorrhynchus albotaeniatus* (♀). n. sp.
- (iv) *Cellia Pharoensis* (♀). Theob.

PLATE II.—WINGS OF ANOPHELINEA.

- (i) *Pyretophorus maculipalpis* (♂). Giles.
- (ii) *Pyretophorus maculipalpis* (♀). Giles.
- (iii) *Myzomyia funesta* (♀). Giles. Sierra Leone.
- (iv) *Myzomyia funesta* (♀). Giles. Var. *subumbrosa*.
- (v) *Myzomyia funesta* (♀). Giles. Var. *umbrosa*. Gambia.

PLATE III.—WINGS OF ANOPHELINEA.

- (i) *Myzorrhynchus barbirostris* (♀). Van der Wulp.
- (ii) *Myzorrhynchus nigerrimus*. Giles.
- (iii) *Myzomyia culicifacies*. Giles.
- (iv) *Myzomyia Turkhudi*. Liston.
- (v) *Myzomyia Rossii*. Giles, var.
- (vi) *Anopheles Lindsayii*. Giles.

PLATE IV.—WINGS OF ANOPHELINEA.

- (i) *Nyssorrhynchus Theobaldi*. Giles.
- (ii) *Nyssorrhynchus Jamesii*. Theob.
- (iii) *Nyssorrhynchus fuliginosus*. Giles.
- (iv) *Nyssorrhynchus maculipalpis*. Giles. India.

PLATE V.—WING SCALES OF GENERA OF ANOPHELINEA.

- (i) *Myzorrhynchus albotaeniatus* (♀). n. sp.
- (ii) *Arribalzagia maculipes* (♀). n. sp.
- (iii) *Nyssorrhynchus Pretoriensis* (♂). n. sp.
- (iv) *Nyssorrhynchus Pretoriensis* (♀). n. sp.
- (v) *Pyretophorus costalis* (♀). Loew.
- (vi) *Anopheles maculipennis* (♀). Meigen.

PLATE VI.—WING SCALES OF ANOPHELINA.

- (i) *Pyrethrophorus Palestinensis* (♀). n. sp.
- (ii) *Pyrethrophorus Chaudoyei* (♀). n. sp.
- (iii) *Anopheles maculipennis* (♂). Meigen. Crete.
- (iv) *Anopheles bifurcatus* (♀). Linn. Crete.
- (v) *Myzomyia Rossii* (♀). Giles. S. India.
- (vi) *Myzomyia culicifacies* (♂). Giles. Lahore.

PLATE VII.—WING SCALES OF ANOPHELINA.

- (i) *Cyclolepteron mediopunctata*. n. sp.
- (ii) *C. mediopunctata* (♀). n. sp.
- (iii) *Anopheles Algeriensis*. n. sp.
- (iv) *Anopheles bifurcatus*. Linn.
- (v) *Cellia albipes* (♀). Theob.
- (vi) *Stethomyia nimba* (♀). n. sp.

PLATE VIII.—WING SCALES OF ANOPHELINA.

- (i) *Pyrethrophorus Jeyporensis* (♀). n. sp.
- (ii) *Myzomyia culicifacies* (♀). Giles.
- (iii) *Pyrethrophorus cinereus* (♀). Theob.
- (iv) *Cyclolepteron Grabhamii* (♂). Theob.
- (v) *Cellia Pharoensis* (♀). Theob.
- (vi) *Cellia pulcherrima* (♀). Theob.

PLATE IX.—HEADS OF ANOPHELINA AND CULICINA.

- (i) *Myzomyia Hispaniola* (♀). n. sp.
- (ii) *Myzomyia Chaudoyei* (♀). n. sp.
- (iii) *Pyrethrophorus cinereus* (♀). Theob.
- (iv) *Culex annulioris* (♂). Theob.
- (v) *Nyssorhynchus maculipalpis* (♂). Giles.
- (vi) *Culex cylindricus* (♂). n. sp.

PLATE X.—WING SCALES OF THEOBALDIA.

- (i) *Theobaldia spathipalpis* (♀). Rondani. Algiers.
- (ii) *Theobaldia spathipalpis* (♀). Rondani. Algeria. (Part of wing.)
- (iii) *Theobaldia incidens* (♀). Thomson.
- (iv) *Theobaldia incidens* (♀). Thomson. (Spot on wing.)
- (v) *Theobaldia annulata*. Meigen. (Dense scaled area.)
- (vi) *Theobaldia annulata*. Meigen. (Dense scaled area at cross-veins.)

PLATE XI.—WING SCALES OF CULICINA.

- (i) *Culex ocellatus* (♀). n. sp.
- (ii) *Culex janitor* (♀). n. sp.
- (iii) *Culex Azoriensis* (♀). n. sp.
- (iv) *Culex Theileri* (♀). n. sp.
- (v) *Grabhamia sollicitans* (♀). Walker.
- (vi) *Grabhamia pygmaea* (♀). n. sp.

PLATE XII.—WING SCALES OF CULICINA.

- (i) *Culex cylindricus* (♀). n. sp.
- (ii) *Stegomyia nigricephala* (♀). Theob.
- (iii) *Taeniorhynchus fulvus* (♀). Wied.
- (iv) *Gilesia aculeata* (♀). n. sp.
- (v) *Melanoconion indecorabilis* (♀). n. sp.
- (vi) *Lutzia Bigotii*. Bellardi.

PLATE XIII.—WING SCALES OF CULICINA.

- (i) *Culex quasigelidus* (♀). n. sp.
- (ii) *Culex Cumminsii* (♀). n. sp.
- (iii) *Mansonia major* (♀). n. sp.
- (iv) *Acartomyia Zammitii*. n. sp.
- (v) *Finlaya poicilipes* (♀). n. sp.
- (vi) *Taeniorhynchus fuscopennatus*. n. sp.

PLATE XIV.—WING SCALES OF CULICINA AND AEDEOMYINA.

- (i) *Grabhamia Durbanensis* (♀). Theob.
- (ii) *Taeniorhynchus fuscopennatus* (♀). n. sp.
- (iii) *Sabethes remipes* (♂). Wied.
- (iv) *Sabethes remipes* (♀). Wied.
- (v) *Phoniomyia longirostris* (♂). Theob.
- (vi) *Uranotaenia apicalis* (♂). Theob.

PLATE XV.—WING SCALES OF GENERA OF AEDEOMYINA.

- (i) *Runchomyia frontosa* (♀). n. sp.
- (ii) *Sabethes* (♀).
- (iii) *Phoniomyia longirostris* (♀). Theob.
- (iv) *Uranotaenia annulata* (♀). Theob.
- (v) *Howardina Greenii* (♀). n. sp.
- (vi) *Dendromyia ulocoma* (♀). n. sp.

PLATE XVI.—LARVA (i) AND PUPA (ii) OF *Melanoconion atratus*, Theob.

PLATE XVII.—LARVA OF *Desvoidea panalectros*, Giles, and *D. fusca*, Theob.

ERRATA.

VOL. I.

Page 111, line 38, *for* "nigerrimus" *read* "fuliginosus."

Page 111, line 41, *for* "fuliginosus" *read* "nigerrimus."

Page 128, line 12, *for* "yellow curved scales" on thorax *read*
"yellow hair-like curved scales."

Page 161, line 19, *for* "hair-like scales" *read* "curved scales."

Page 402, line 28, *for* "simple" *read* "uniserrated."

VOL. II.

Page 2, line 24, *for* "simple" *read* "uniserrated."

Page 18, line 18, *delete* "in the simple unguis and in the venation."

Page 208, line 7, *for* "basal" *read* "apical."

Page 208, line 25, *for* "basal" *read* "apical."

Page 208, line 26, *for* "simple" *read* "uniserrated."

Page 350, line 35, *for* "scutellum" *read* "metanotum."

A MONOGRAPH

OF THE

CULICIDAE OF THE WORLD.

GENERAL NOTES.

Several notes of general interest have been made and sent by correspondents that can scarcely be incorporated in the systematic part of this book. These are presented here.

THE RELATIVE FREQUENCY OF CULICINA AND ANOPHELINA.

It is interesting to note the relative frequency of these two sections of the *Culicidae*. In most cases observations made personally during the past two years show that in Great Britain the *Anopheles*, where they occur at all, are relatively more abundant in habitations than *Culex*.

At Great Staughton during August the numbers counted in a privy in the morning were as follows during the week ending the 26th:—

20th	10 AM.	Culex 12	Anopheles 37
21st		Culex 20	Anopheles 15
22nd		Culex 7	Anopheles 40
23rd		Culex 12	Anopheles 17
24th		Culex 2	Anopheles 7
25th		Culex 30	Anopheles 14
26th		Culex 8	Anopheles 27

The species were *Culex pipiens* and *Anopheles maculipennis*.

At Wye, again, observations were made during August,

September and October, again in a privy and also in a bedroom.

AUGUST.	Between	<i>In privy.</i>		<i>In bedroom.</i>	
12th	.. 8 & 10 A.M.	.. Culex 4; Anopheles	6	.. Culex 2; Anopheles	5
13th	.. "	.. Culex 1; Anopheles	8	.. Culex 1; Anopheles	6
14th	.. "	.. Culex 7; Anopheles	15	.. Culex 1; Anopheles	3
15th	.. "	.. Culex 3; Anopheles	3	.. Culex 5; Anopheles	12
16th	.. "	.. Culex 7; Anopheles	12	.. Culex 8; Anopheles	12
17th	.. "	.. Culex 9; Anopheles	8	.. Culex 2; Anopheles	9
18th	.. "	.. Culex 1; Anopheles	4	.. Culex 3; Anopheles	4

SEPTEMBER.	<i>In privy.</i>		<i>In bedroom.</i>	
3rd	.. Culex 12; Anopheles	3	.. Culex 4; Anopheles	6
4th	.. Culex 14; Anopheles	7	.. Culex 7; Anopheles	8
5th	.. Culex 20; Anopheles	14	.. Culex 2; Anopheles	2
6th	.. Culex 8; Anopheles	20	.. Culex 3; Anopheles	4
7th	.. Culex 15; Anopheles	6	.. Culex 4; Anopheles	1
8th	.. Culex 3; Anopheles	5	.. Culex 2; Anopheles	1
9th	.. Culex 9; Anopheles	4	.. Culex 1; Anopheles	0

OCTOBER.	<i>In privy.</i>		<i>In bedroom.</i>	
5th	.. Culex 20; Anopheles	4	.. Culex 12; Anopheles	2
6th	.. Culex 17; Anopheles	3	.. Culex 0; Anopheles	1
7th	.. Culex 30; Anopheles	2	.. Culex 4; Anopheles	4
8th	.. Culex 12; Anopheles	4	.. Culex 0; Anopheles	6
9th	.. Culex 5; Anopheles	9	.. Culex 12; Anopheles	0
10th	.. Culex 8; Anopheles	8	.. Culex 3; Anopheles	0
11th	.. Culex 10; Anopheles	0	.. Culex 1; Anopheles	2

It will thus be seen that in some districts *Anopheles* are more abundant at certain times than *Culex* in this country. In other places *Anopheles* do not occur indoors at all, the genus being represented by *A. bifurcatus*, which I have not found far from woods. In most warm climates, however, *Culicinae* largely preponderate.

A series of careful observations on this subject have been made by Dr. Theiler at Pretoria, which are tabulated in the appended chart, which shows the frequency of *Culex* and *Anopheles* on the river at Pretoria.

"The larvae were collected three times a week and then left alone for hatching. Every day the numbers were counted; the chart shows, therefore, the relative value, and is made up with the intention to compare in which proportion *Anopheles* and *Culex* may be found. The *Anopheles* were only found in the river in certain spots, usually in small pools of water alongside the river bed, into which run some small springs. The best breeding place was behind a rock, which protected the pool underneath from the afternoon sun. The *Culex* were collected out of pools in no connection with the river and in tubs."

The *Anopheles* sent by Dr. Theiler were mainly *P. cinereus* (Theobald) and *P. Pretoriensis* (Theobald), and a few *N. maculipalpis* (Giles) and *M. Mauritianus* (Grandpré).

The so-called "brown *Anopheles*" of Dr. Theiler was *cinereus*, the "black *Anopheles*," *Pretoriensis*. For relative date of appearance of species, *vide* pages 78 and 99.

THE PAIRING OF MOSQUITOES.

Observations have now been made on the pairing of several mosquitoes. Dr. Low sends me the following notes on *Stegomyia fasciata* and *Culex fatigans* :—

"*S. fasciata*.—As soon as the insects emerge from the pupae, even on the first day, they begin to breed ; the males flying after and chasing the females till they catch them, and then fly about joined together. This takes place in this genus by day and by night, and I have watched a male copulate with the same female several times. After they part from each other, the male pursues another female, until it may have fertilised many in a day. In one cage, in which there were fifteen old females, I one day introduced two young males. They immediately proceeded to breed, and went on doing so for hours. I did not actually determine the time spent in copulâ, but it was always short, a minute or less, and not like the prolonged act of the Dragon-flies."

"*C. fatigans*.—In this species both males and females sleep by day, but it is a quite common sight to see them pairing at night."

NOTE ON MALARIA AND MOSQUITOES OF THE WABASH VALLEY, CASS COUNTY, INDIANA, U.S.A.

The following note was sent by Dr. Robert Hessler, A.M., M.D. :—

The lowlands along the Wabash River in this part of Indiana were in former years notorious on account of the prevalence of malaria ; but at the present time cases of malarial infection are seldom seen, and, moreover, usually yield promptly to medicinal treatment. Presumably this is due to the fact that reinfection is rare at present, and because quinine is given in liberal doses. The rarity of malaria at present is ascribed to the extensive drainage that has been made ; pools of stagnant water are seldom seen, and the river itself has sufficient current to render the water unfavourable for the development of the mosquito

larvae. Some observations were made during the summer on the occurrence of different species of mosquitoes. Here, in Logansport, all specimens seen were *Culex fatigans*, while away from the city, and especially about the small pools and shaded hill-side springs, specimens of the genus *Anopheles* (*punctipennis* and *maculipennis*) are abundant.

MOSQUITOES IN SPIDER SNARES.

Dr. Durham sends the following note from Selangor, in regard to mosquitoes being caught in spiders' webs :—

Generally speaking, it is not usual to find Gnats or Midges thus caught—indeed they may be seen to settle on them and to fly away again. “In a house at Taiping (Perak),” writes Dr. Durham, “there was a small spider (perhaps about 4 mm.) which lived in tiny holes or defects on the surface of the plaster walls of the house (outside). Around this was a circular snare about the area of a crown piece, fairly closely woven of exceedingly delicate threads ; at a short distance these snares merely looked like dirty or mildewy patches on the wall. Mosquitoes, midges, and Tineid moths seemed to be the prey ; they were caught by entanglement of the feet, and sometimes were quite set out as on a mounting-card. The design is no doubt good for catching such insects which fly against a wall, and snares had as many as a dozen or more mosquitoes in them. I have not found the same beast again in houses, and regret I did not take any specimens.”

MOSQUITOES FEEDING ON A CORPSE.

Dr. Durham has also observed mosquitoes feeding on a corpse. He writes : “On 11th August, 1902, when performing autopsy on a Chinaman—dead three hours—a *S. fasciata* (of which there were several about) settled on inner side of thigh and started to feed ; it was allowed to fill itself nearly, in order to be sure that it was sucking, and then was squashed.”

VARIATION IN WING-MARKINGS AND IN POSITION OF THE CROSS-VEINS.

Captain James writes, that “the same mosquito shows different markings at different seasons of the year. For example, I have caught a good number of *A. fuliginosus* here in Madras this month (March). The markings on the wings of all of these

are the same, but they differ considerably from the markings in all your drawings of this species (drawn from specimens taken in December)."

That the amount of variation in wing-markings is very great I am fully convinced, and the actual number of spots, for instance, cannot be taken alone as of specific value. Some species are very constant, others extremely variable.

This occurs not only in the *Anophelina*, but also in the spotted winged *Culicina* (i.e. genus *Theobaldia*). The cross-veins seem to be most unstable in certain species of *Culicidae*, both amongst the *Anophelina* and *Culicina*, but I have never observed this to occur in the *Aedeomyia* except in *Sabethes*. Certain species of *Anopheles* have the cross-veins fairly constant, others have them so in one district, not in another, whilst others seem to be always subject to variation. In *Culex pipiens* I pointed out in vol. ii. p. 135, that the relative positions of the cross-veins may not be the same in the two wings of one specimen. I have since found this to occur in *Theobaldia incidens* (called to my notice by Professor Aldrich), in *Myzomyia Rossii* and *M. funesta*. Captain James has observed the same in *M. culicifacies*. Under the circumstances, the position of the cross-veins cannot be taken to be of any specific value in closely allied species, not that one would be likely to base a species on one such character when we know the great variation in this respect in certain species.

This variation in position of the cross-veins was first called attention to in *Anophelina* by Drs. Stephens, Christophers, James, and Liston, while working on the Indian *Anopheles*.

PALPAL ORNAMENTATION.

Considerable importance has been placed by the above mentioned workers in India on the banding of the ♀ palpi. This banding is certainly most constant, except in such species as *maculipalpis*, where the palps are not only banded, but mottled with pale scales, and to some extent in the genus *Myzorhynchus*, in which I have observed constant variation, as previously pointed out. But for such species as are included in the genera *Myzomyia* and *Nyssorhynchus*, etc., there is no doubt that the palpal ornamentation gives a character by which we may readily separate closely allied species. This is, however, merely a question of colour, and cannot be taken to be a character of specific value. In only one instance in the two genera mentioned have I come across two

species with similar wing ornamentation and general structure in which the palpi are markedly distinct, viz., *P. costalis*, Loew, and *P. Marshallii*, Theobald, and it may prove that at some future date we shall find them to be the same; the palpi are so strongly contrasted that they, together with other slight differences, compelled me to separate the two as distinct species.

FOREIGN TERMS FOR MOSQUITOES.

Besides those given on p. 90, Vol. I., we may add the following:—"Mutchers," Hindustani.

THE LENGTH OF TIME STEGOMYIA EGGS CAN WITHSTAND DESICCATION.

Through the kindness of Dr. Finlay, I received some ova of *Stegomyia fasciata* from Cuba. Owing to stress of work these were neglected, being left in the dry glass tube for two months after their arrival in the country. Out of curiosity, I placed them in water, with the chill off, in a greenhouse. About 12 o'clock A.M., the next day, most of the eggs had hatched and the larvae were very active. Out of about fifty, only six reached the pupal stage, and these produced one female and five males.

The eggs of *Culicidae* can probably all remain dormant under such circumstances; so that should a pool dry up before they hatch, the eggs may not be destroyed, water apparently being essential for the incubation. It is therefore not at all impossible that *Anopheles*, etc., may, under stress of circumstances, lay their ova on dry surfaces.

CLASSIFICATION OF CULICIDAE BY THE PALPAL JOINTING.

M. Neveu-Lemaire, whilst following in many respects my grouping of the *Culicidae*, formulates a classification mainly based on the number of joints in the palpi of the ♀ and the venation.* By taking these characters, he still upholds certain genera I proposed and based almost entirely on scale structure. But if the palpal structure, good as it is, is adhered to, we must give up ordinary dry specimens and let their place be taken by balsam preparations. This is surely going the wrong way,

* Compt. rendus des séances de la Société de Biologie: séance du 29 Nov. 1902.

for I defy anyone to identify in the field a specimen from the description or appearance of a balsam-preparation. For working purposes we must retain the old entomological method of preparing and keeping these insects in their adult stage. Now, if we do this, the palpal characters are of very doubtful value, for in anything like a good specimen we cannot see the number of joints, which are hidden by the dense covering of scales. For this reason I have not paid any particular attention to these structures upon which Arribalzaga founded some of his genera. Whilst acknowledging that these structures are of value, as shown by my friend, I feel sure they can only be treated as of secondary importance on account of the difficulty of seeing the joints in anything like a good specimen, and, moreover, we find closely related species with different palpi and a great variety of forms of palpi amongst the section *Culicina*. On the other hand, we can easily see the minutiae of scale structure in any good or even fair specimen, and species should not be described from worn and broken material, much less from balsam preparations alone. Palpi are of undoubted importance, but they must of necessity take a secondary place when, as often happens, we have only one or two specimens of a new species to describe. We get very great variation in the palpi of closely related species as seen in *Stegomyia sugens* and *Stegomyia Marshallii*, and a close similarity in such widely different insects as *Desvoidia ventralis* and *Joblotia nivipes*, but by the squamose characters we can at once see the two former are related and the two latter quite distinct. Anyone acquainted with the use of a microscope can easily see the scale structure in any of the *Culicidae*, in many a Coddington lens will alone reveal the characters. The scales can be seen much more readily than the jointing of the palpi. Palpal characters, I feel sure, are only of help specifically in regard to their jointing, for we find similar forms in totally distinct genera.

With regard to the nervures of the wings, we certainly cannot take those characters *alone*, for we know how extremely variable they are even in one batch of insects hatched from eggs laid by a single female (*vide* remarks on variability in cross-veins, etc., p. 5).

In the ♂'s we find more palpal variation than in the ♀'s, but unfortunately the male palpi shrink in death, and their exact form cannot be determined. The palpal character of the genus *Theobaldia*, proposed by M. Neveu-Lemaire, is much more marked

in the ♂ than in the ♀, the apices being clubbed. We also find the scale structure of *Theobaldia* different. If we adopt the palpal jointing, we can split the genus *Culex* (in the restricted sense) up into a great number of genera, most with only a single representative; for this reason I only look upon the form of the palpi as of specific importance.

If the body of a mammal, say a horse, were clothed with flattened hairs of considerable breadth, we should not place that mammal in the genus *Equus*, but in a distinct genus. The same applies to the *Culicidae*, and hence scales are taken as generic characters, more so on account of the scaly nature of the *Culicidae* being one of the most important characters of the family.

M. Neveu-Lemaire's classification is here appended:—

I. *Anophelinae*.—Maxillary palps as long as the proboscis in both sexes; first sub-marginal cell equal to or longer than the second posterior cell; proboscis straight; maxillary palps with three joints in the ♂; four in the ♀. (3. genera.)

Scales of the wings lanceolate..... *Anopheles*, Meigen.

Scales of the wings long and narrow..... *Myzomyia*, Blanchard.

Scales of the wings large and expanded... *Cyclolepidopteron*, Theobald.

II. *Megarhininae*.—Maxillary palpi as long as the proboscis in the ♂; as long or much shorter than the proboscis in the ♀; first sub-marginal cell smaller than the second posterior cell; proboscis re-curved; maxillary palpi of the ♂ 5-jointed. (2. genera.)

Palpi of the ♀ as long as the proboscis,
and 5-jointed* *Megarhinus*, Rob.-Desvoidy.

Palpi of the ♀ much shorter than the
proboscis; 3-jointed..... *Toxorhynchites*, Theobald.

III. *Culicinae*.—Maxillary palpi as long or longer than the proboscis in the ♂; always shorter than the proboscis in the ♀; first sub-marginal cell equal to or longer than the second posterior cell.

/Proboscis curved in the ♀ *Psorophora*,
Rob.-Desvoidy.

Posterior cell longer than the marginal cell	♂	Palpi 3-jointed in the ♀.	{	Third palpal joint as long or longer than the other two	<i>Culex</i> , Linné.
				The 3 joints of equal length	<i>Stegomyia</i> , Theobald.
				Palpi less than $\frac{1}{3}$ rd the length of the proboscis ...	<i>Theobaldia</i> , Neveu-Lemaire.
				Palpi more than $\frac{1}{3}$ rd the length of the proboscis; scales of the wings expanded	<i>Mansonia</i> , Blanchard.
		Palpi 4-jointed in the ♀.†	{		
		Palpi 5-jointed in the ♀		<i>Taeniorhynchus</i> , Arribalzaga.	

* *Megarhinus violaceus* (= *purpureus*, Theobald) has only 4-jointed palpi.—F. V. T.

† *Culex vittiger*.—Skuse has 4-jointed palpi, but cannot come in either of these genera, being quite distinct.

- Posterior cross-vein continuous with the
mid cross-vein *Joblotia*,
Blanchard.
- Posterior cross-vein nearer the apex of the
wing than the mid *Mucidus*,
Theobald.

IV. *Aedeinae*.—Palpi much shorter than the proboscis in both sexes.
(6. genera.)

equal second	Palpi with 2 or 3 joints in both sexes.	{	Scales of the wings as in <i>Culex</i>	<i>Aedes</i> , Meigen.*
			Scales of the wings expanded as in <i>Mansonia</i>	<i>Aedeomyia</i> , Theobald.
marginal greater than first cell	Posterior cross-vein nearer the base of the wing than the mid cross-vein.	{	Palpi 4-jointed (♀)	<i>Wycomyia</i> , Theobald.
			Palpi 5-jointed in both sexes ...	<i>Haemagogus</i> , Williston.
First to 0	Posterior cross-vein nearer the apex of the wing than the mid cross-vein†	{	<i>Sabethes</i> , Rob.-Desv.	
			First sub-marginal and second posterior cells very small; the first sub-marginal shorter than the second posterior cell.....	
			<i>Uranotaenia</i> , Arribalzaga.	

One of the most peculiar of all the genera of this last section
is *Deinocerites*, is not mentioned in this list, nor is the very
distinct genus *Janthinosoma*.

SUB-FAMILY ANOPHELINA.

THE CLASSIFICATION OF THE ANOPHELINA.

The genus *Anopheles*, founded by Meigen in 1818, has now
grown to a considerable size, about seventy-six species being known.
Some of these present very close structural features, others very
diverse ones. The genus as it previously stood had become somewhat
unwieldy like *Culex*, and as there is seen to be such a diversity
of characters in these *Culices*, which have long palpi in both
sexes, I have divided them up into several genera. There is a
very great difference, for instance, between *A. maculipennis* and
C. Pharoensis, between *C. argyrotarsis* and *M. Rossii*; the
differences, in fact, are quite as great as between *Mansonia* and
Culex or *Sabethes* and *Aedes*.

In the classification of the *Anophelina*, I have found, just

* The ♀ *Aedes* (*s. re*) has 5-jointed palpi.

† There are exceptions to this (i.e., *S. albiprivus*).

as in the *Culicidae* as a family, that the scale structure is the best to take for generic distinction. This grouping is based entirely on the scales of the head thorax, abdomen, and to some extent on the wings. It will be noticed that by these characters a natural grouping is formed, and that it, in the main, tallies with what we know of grouping them by their larval structure. I do not think that the minute structural differences in the larvae should be taken as of greater value than specific characters; but it is of interest to find that classification by certain larval and certain adult characters give the same result.

The following genera may be recognised :—

Genus 1. *ANOPHELES*. Meigen.

„ 2. *MYZOMYIA*. Blanchard.

„ 3. *CYCLOLEPPTERON*. Theobald.

„ 4. *STETHOMYIA*. Theobald.

„ 5. *PYRETOPHORUS*. Blanchard.

„ 6. *ARRIBALZAGIA*. nov. gen.

„ 7. *MYZORHYNCHUS*. Blanchard.

„ 8. *NYSSORHYNCHUS*. Blanchard.

„ 9. *CELLIA*. Theobald.

„ 10. *ALDRICHIA*. nov. gen.

These genera may be tabulated as follows :—

Thorax and abdomen with hair-like curved scales.	Prothoracic lobes simple; no flat head scales.	Wing scales lanceolate	<i>Anopheles</i> .
			Wing scales mostly long and narrow ...
			Wing scales partly large and inflated ...
Thorax with narrow curved scales; abdomen hairy.	Prothoracic lobes mammillated: median flat head scales.	Wing scales lanceolate	<i>Stethomyia</i> .
			Wing scales small, lanceolate or narrowed
			Wing scales small, lanceolate or narrowed
Thorax with hair-like curved scales; abdominal scales on venter only, with a distinct ventral apical tuft; no lateral tufts	Abdominal scales as lateral tufts and dorsal patches of small flat scales; thoracic narrow-curved or spindle shaped	Abdomen nearly completely scaled with irregular scales and with lateral tufts	<i>Pyretophorus</i> .
			<i>Arribalzagia</i> .
			<i>Myzorhynchus</i> .
Thorax and abdomen with true scales.	Abdomen completely scaled with large flat scales as in <i>Culex</i>	Abdomen completely scaled with large flat scales as in <i>Culex</i>	<i>Nyssorhynchus</i> .
			<i>Cellia</i> .
			<i>Aldrichia</i> .

Genus 1. ANOPHELES. Meigen. (Fig. I., 1.)

Thorax and abdomen with hair-like curved scales, practically hairs; palpi in the ♀ thin, not densely scaled; wings with the

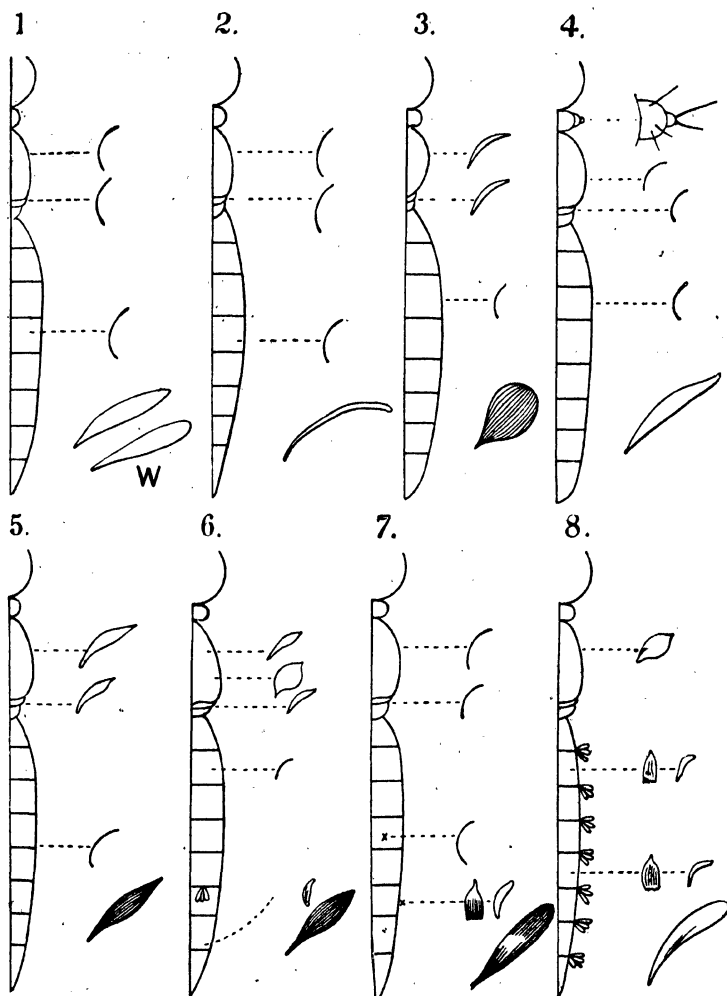


Fig. I.

Squamose characters of *Anophelina*.

1. *Anopheles* (Meigen); 2. *Myzomyia* (Blanchard); 3. *Cyclolepteron* (Theobald); 4. *Stethomyia* (Theobald); 5. *Pyretophorus* (Blanchard); 6. *Nyssorrhynchus* (Blanchard); 7. *Myzorrhynchus* (Blanchard); 8. *Cellia* (Theobald).

(Note.—The scales on thorax in 3 are too wide.)

veins covered with lanceolate scales, which may or may not form spots, which, if present, are never so numerous as in the other genera. The majority large species.

Type, *maculipennis*. Meigen.

The following species are included in this genus besides the type: *bifurcatus*, Linnaeus; *Algeriensis*, Theobald; *Walkeri*, Theobald; *punctipennis*, Say; *Lindsayii*, Giles; *crucians*, Wiedermann; *nigripes*, Staeger; *gigas*, Giles; *pseudopunctipennis*, Theobald; *immaculatus*, Theobald; *Aitkenii*, James; *stigmaticus*, Skuse (?). This genus was formed by Meigen on *maculipennis*, and he included *bifurcatus*; later *nigripes* was added. I have therefore retained the genus in the restricted sense for these species.

Genus 2. MYZOMYIA. Blanchard. (Fig. I., 2.)

Grassia. Theobald.

(Compt. Rend. Hebdom. Soc. de Biolo. 23, p. 795, 1902 (Blanchard); Journ. Trop. Med., II., p. 181 (1902), Theobald.)

Thorax and abdomen with hair-like scales, sometimes a few narrow-curved ones projecting over the head; wings mostly with long, thin, lateral vein-scales; the wings are usually much spotted; the majority small or moderate sized species. Palpi not densely scaled.

Type, *funesta*. Giles.

The following are included in this genus: *Rossi*, Giles; *Rhodesiensis*, Theobald; *culicifacies*, Giles; *Listoni*, Liston; *longipalpis*, Theobald; *leptomeres*, Theobald; *Turkhudi*, Liston; *albirostris*, n. sp.; *aconita*, Dönitz; *Lutzi*, Theobald; *punctulata*, Dönitz; *hebes*, Dönitz; *Hispaniola*, n. sp.; *Ludlowii*, n. sp.; *tesellatum*, Theobald; *leucophyrus*, Dönitz; *elegans*, n. sp. (James); *impunctus*, Dönitz (?).

Genus 3. CYCLOLEPTERON. Theobald. (Fig. I., 3.)

Differs from the two former genera in that the wings have large inflated scales as well as typical lanceolate ones. Palpi densely scaly.

Type, *C. Grabhamii*. Theobald.

Two species only are known in this genus, the type and *C. mediopunctatus*, Lütz (MS.).

Genus 4. *STETHOMYIA*. nov. gen. (Fig. I., 4.)

Thorax and abdomen hairy and bristly; prothoracic lobes mammillated; wings with narrow lanceolate scales, and the head with a median patch of flat scales. Palpi of the ♀ very thin.

Type, *S. nimba*. n. sp.

The genus contains only one species, readily separated by the head scales, mammillated prothoracic lobes and very thin palpi.

Genus 5. *PYRETOPHORUS*. Blanchard. (Fig. I., 5.)

Howardia. Theobald.

(Compt. Rend. Hebdom. Soc. d. Biolog. 23, p. 795, Blanchard; Journ. Trop. Med., V., p. 181, (1902), Theobald.)

Thorax with narrow-curved scales often quite large; abdomen with hairs, no scales except on the external genitalia; wing scales small and lanceolate or long and rather thin; wings much spotted; palpi of the ♀ moderately scaled.

Type, *costalis*. Loew.

This genus includes, besides the type, the following: *minimus*, Theobald; *Marshallii*, n. sp.; *Chaudoyei*, n. sp.; *atratipes*, Skuse; *Jeyporensis*, n. sp.; *superpictus*, Grassi; *cinereus*, Theobald; *Palestinensis*, n. sp.; *merus*, Dönitz (?).

Genus 6. *ARRIBALZAGIA*. nov. gen.

Thorax with narrow-curved hair-like scales, palpi densely scaly; wings with the membrane tinged, wing scales dense, bluntly lanceolate. Abdomen hairy, with prominent lateral apical scale tufts to the segments, and scales on the venter.

Type *maculipes*. n. sp.

Genus 7. *MYZORHYNCHUS*. Blanchard. (Fig. I., 7.)

Rossia. Theobald.

Compt. Rend. Hebdom. d. Soc. Biolog. 23, p. 795 (1900), Blanchard; Journ. Trop. Med., V., p. 181 (1902), Theobald.)

Thorax with hair-like curved scales; the abdomen with ventral and apical scales, and a median ventral apical tuft; wing scales broadly lanceolate; palpi densely scaled in the ♀ and also the proboscis.

Type, *sinensis*. Wiedemann.

This genus includes also all the sub-species of *sinensis* *vanus*, Walker; *nigerrimus*, Giles; *Indiensis*, Theobald; and *pseudopictus*, Grassi; *barbirostris*, Van der Wulp; *paludis*, Theobald; *Bancroftii*, Giles; *Mauritanus*, Grandpré; *umbrosus*, n. sp.; and *albotacniatus*, n. sp.; *minutus*, n. sp.

Genus 8. NYSSORHYNCHUS. Blanchard. (Fig. I., 6.)

Laverania. Theobald.

(Compt. Rend. Hebdom. d. Soc. Biolog. 23, p. 795, Blanchard;
Journ. Trop. Med., V., p. 181, Theobald.)

Thorax with narrow-curved and spindle-shaped scales; abdomen with small flat or narrow dorsal scales, especially on the apical segments; wing scales bluntly lanceolate; palpi densely scaled; legs banded, mottled, and spotted with white, the hind tarsi usually with one or more pure white joints.

Type, *maculatus*, Theobald.

This genus contains, besides the type, the following: *fuliginosus*, Giles; *Jamesii*, Theobald; *Theobaldi*, Giles; *Stephensi*, Liston; *annulipes*, Walker; *Masteri*, Skuse; *deceptor*, Dönitz (?); *Willmori*, n. sp. (James); *maculipalpis*, Giles; *Pretoriensis*, n. sp.; *Karwari*, n. sp.

Genus 9. CELLIA. Theobald. (Fig. I., 8.)*

(Journ. Trop. Med. V. p. 181.)

Thorax with flat spindle-shaped scales; abdomen covered with irregular scales and with dense lateral tufts; palpi of ♀ densely scaly; wing scales large, bluntly lanceolate, wings densely scaled.

Type, *Pharoensis*. Theobald.

This genus also includes the following:—*pu'cherrima*, Theobald; *argyrotarsis*, Rob.-Desvoidy; *albipes*, Theobald; *squamosa*, Theobald; *Kochii*, Dönitz; *Bigotii*, Theobald.

THE LARVAE AND OVA OF ANOPHELINA AND CULICINA.

Grassi first pointed out the difference between certain *Anophelina* (as *maculipennis* and *bifurcatus*) in their larval stage,

* For Genus 10, *Aldrichia*, vide Appendix.

the character separating them being the frontal hairs on the head. This character has proved of great value and has been

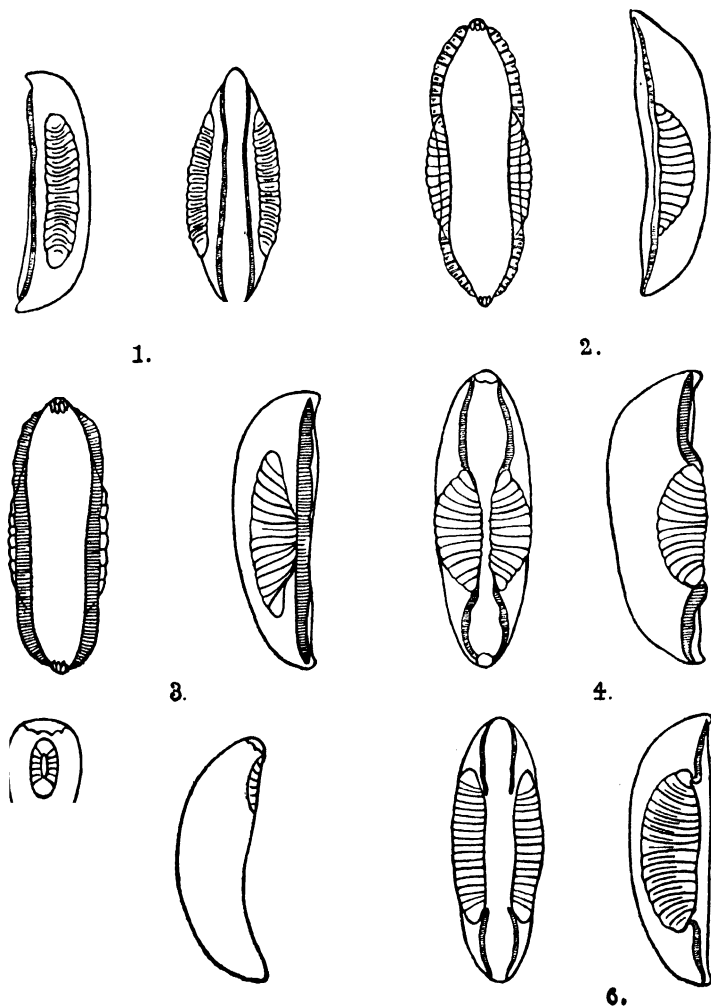


Fig. 2.

Ova of *Anophelina* (after Christophers and Stephens.)

1. *M. culicifacies*; 2. *C. pulcherrimus*; 3. *M. Rossii*; 4. *N. Stephensii*; 5. *M. Turkhudi*;
6. *N. maculipalpis* (*Jamesii*, C. and S.).

employed by Drs. Christophers and Stephens in separating the larvae of Indian *Anopheles*. These characters are of especial

value when we are dealing with two such closely allied insects as *argyrotarsis*, of Desvoidy, and my so-called sub-species *albipes*. If there were proved to be a difference, say, in the frontal larval hairs, then I would look upon my sub-species as a distinct species, but, until that is proved, I cannot agree with Colonel Giles and others in raising it to a species because it has a black band on its hind tarsi, whereas *argyrotarsis* has not. It is most important to trace out these larval characters as long as we are certain that we are dealing with the larvae of a known imago; but if we give an account of the larva of something we think it may turn into, then endless confusion will ensue. (Take, for instance, Giles's figure of the frontal hairs of *M. Rossii*.)

In *Culicina* the difference of the larvae is still greater; the notable differences will be seen to be in the size and shape of the respiratory siphon and in the anal flaps. The genus *Desvoidia* certainly comes very dangerously near *Stegomyia* on adult characters, save the palpi, and yet we find a great difference between the larvae of the two genera (*vide* fig. 16, Vol. I., and Plate XVII., III.). Here, again, the separation or union of pseudo species, or species respectively, may be helped by larval characters. *Culex fatigans* and its various sub-species and varieties I feared might prove to be different species on larval characters, but I have so far been unable to find any difference in the larvae from different parts of the world, and thus I feel more sure that the great number of differently coloured, different sized *Culex* in which there is such enormous variation in the relative positions and lengths of the cross-veins, fork-cells, and their stems, are really all one elastic species.

In the eggs (*vide* fig. 2) of *Anopheles* we also find considerable difference in the different species. Most of the Indian species have been figured by Drs. Christophers and Stephens. In the *Culicina* there does not seem to be such a great difference in species, but, as previously pointed out (Vol. I., p. 19), there are considerable differences in the eggs of different genera (*i.e.*, *Mansonia* and *Stegomyia*).

GENUS 1. **ANOPHELES.** Meigen.

(Mono. Culicid. I., p. 115, 1901.)

(Plates V. and VI.)

Thorax and abdomen clothed with hair-like curved scales, practically hairs; the palpi of the female thin, not densely scaled, generally unbanded. Wing veins covered with long lanceolate scales (Plate V.), which may or may not form spots, but which, if present, are never so numerous as in other genera. They are mostly large species and either belong to temperate climates or are hill species, when occurring in tropical climates.

ANOPHELES MACULIPENNIS. Meigen.

(Mono. Culicid. I., 1901, p. 191.)

(Plates V. and VI.)

Additional localities.—Crete, Cyprus. It is recorded from numerous fresh localities in the United States.

Notes.—In the Palestine specimens brought back by Dr. Cropper, the wing spots are very faint and they are all small in size, and the cross-veins are not all normal. The Crete specimens are also very small and with faint wing spots.

The reviewer of the first two volumes of this monograph in *Nature* states that this species is found gorged with blood in Great



Fig. 3.

Anopheles maculipennis (♀). Meigen.

From Crete.

Britain. Where he gets his information from I do not know, but wherever it comes from it is exceptional, for *Anopheles maculipennis* certainly does not suck blood here as a rule, nor does it occur, as he says, everywhere in Great Britain. I have lived for years in districts where it is very abundant and have never known it bite anyone, nor has anyone observed it to bite in those neighbourhoods, notably Kent and Huntingdonshire, as well as many others.

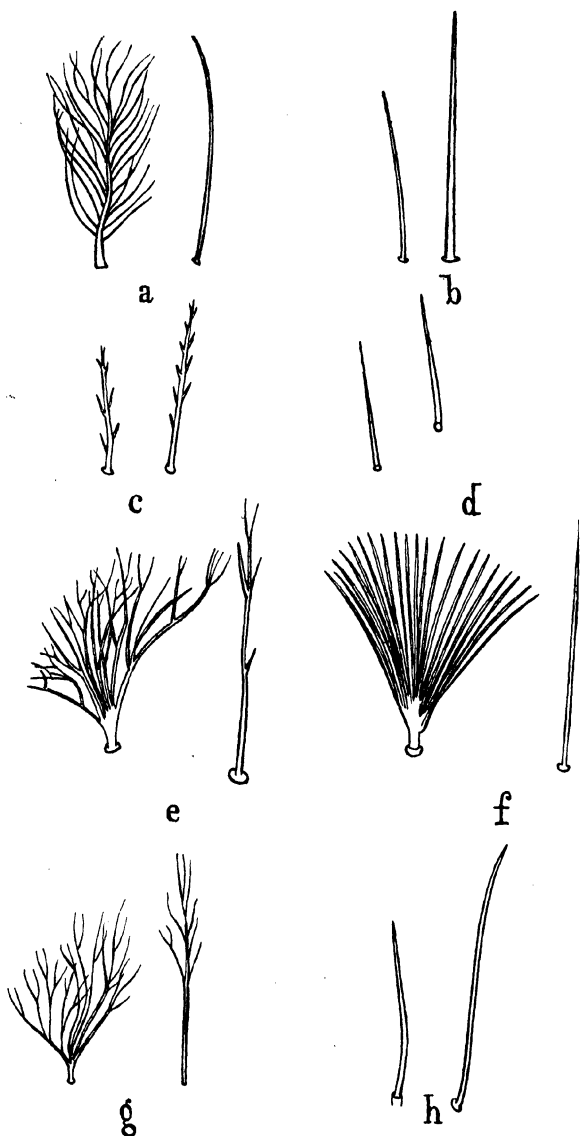


Fig. 4.

Frontal hairs of larval *Anophelina*.

a, *M. Rossii* (according to Giles, but not so *vide* fig. 24); b, *N. Theobaldi*; c, *P. superpictus*; d, *M. Turkhudi*; e, *M. sinensis*; f, *M. barbirostris*; g, *A. maculipennis*; h, *A. bifurcatus*.*

* There is an additional hair, rather long, on each side of those represented in *M. Turkhudi* (Fig. 4, d).

The scales.—Dr. Nuttall and Mr. Shipley have pointed out * that there are no scales (narrow curved) on the head and scutellum in this species. They do not occur in true *Anopheles*, but in all or nearly all the related genera. When the first two volumes were issued all the *Anopheles* except *Grabhamii* were placed in one genus, and as the majority then examined had narrow-curved head and scutellar scales, it was given as typical.

These authors figure the anterior ♂ unguis slightly different to what I have seen, for a small second claw is always well developed, but not nearly to the extent I figured it in Vol. I. (fig. 57).

The larva.—The frontal hairs (Fig. 4, g) are all four plumose, and the antennae have two spines and a median plumose bristle and a lateral plumose bristle.

There are five pairs of palmate bristles with pointed rays. Howard figures seven pairs of these structures; if this is accurate then the American *Anopheles* is not the same as ours and *A. maculipennis* and *A. quadrimaculatus* must be distinct, although one can detect no difference in the adults.

ANOPHELES PUNCTIPENNIS. Say.

(Mono. Culicid. I., 1901, p. 183.)

Notes.—This species breeds in the same localities as *A. maculipennis*. Like the latter species, it is found widely distributed in North America. The traces of grey palpal bands mentioned on page 189, Vol. I., are very exceptional. I have only noticed it in one more specimen. They are generally all brown.

ANOPHELES BIFURCATUS. Linnaeus.

Anopheles Walkeri. Theobald (?).

(Mono. Culicid., I., p. 195 (*bifurcatus*), p. 199 (*Walkerii*)).

(Plates VI. and VII.)

The following should be added to my previous description of this species :—

The golden hair-like thoracic scales are so disposed as to leave two broad median parallel bare lines in front of the mesonotum, and in some British specimens the sides of the anterior part of the mesonotum are bright chestnut-brown. The

* Jour. of Hygiene, I., p. 480.

abdominal hairs are mostly golden. Cross-veins variable in position.

Length varies from 5 to 6 mm.

a

h

Fig. 5.

a, Cross-veins of *Anopheles Algeriensis*; b, Cross-veins of *Anopheles bifurcatus*, Linn.
(These cross-veins vary in each species.)

Notes.—The Scotch specimens are usually larger than those from the South of England.

No new Canadian specimens have been received, and I rather doubt the validity of *A. Walkeri*. The head ornamentation is

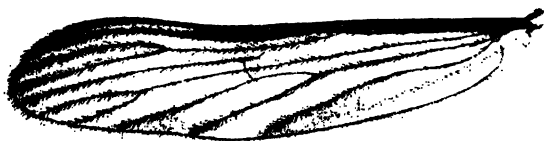


Fig. 6.

Anopheles bifurcatus. Linn. ♀. England.
(Showing curious contour of wing of frequent occurrence.)

very slightly different, and both forms of scales figured on p. 197 are found on one individual. I thus feel inclined to sink *Walkeri* as a synonym of *bifurcatus*.

A number of specimens have been received from Cyprus,



Fig. 7.

A. bifurcatus. ♀. Crete.

and Crete, which are much smaller than British specimens of *bifurcatus*. They look quite distinct, yet might be a small variety of this species.

ANOPHELES ALGERIENSIS. n. sp.

(Plate VII.)

Resembles *A. bifurcatus* in regard to head ornamentation and the cephalic appendages. The thorax is, as a rule, like the former species, but is sometimes of a brighter brown hue. Abdomen with

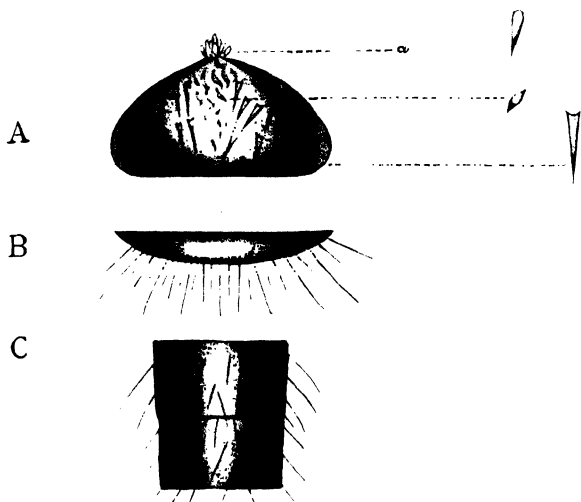


Fig. 8.

Anopheles Algeriensis. n. sp. (♀).

A, Head ; B, Scutellum ; C, Abdomen. a, Scale tuft in front.

a certain amount of pale basal markings to the segments in some specimens, not in others, but always with dull brown hairs instead of golden ones as in *A. bifurcatus* ; wings with similar scales, the stem of the first sub-marginal cell variable in length, often more



Fig. 9.

Wing of *Anopheles Algeriensis*. ♀. n. sp. Algeria.

than half the length of the cell ; cross-veins (Fig. 5) variable, as in *bifurcatus*. The first sub-marginal cell is shorter than in *bifurcatus*.

Length.—3·8 to 4·5 mm.

Habitat.—Algeria (Dr. Sergent).

Notes.—I can detect no structural peculiarities in these small specimens, yet they look very distinct from our large *bifurcatus*.

The only marked differences, save their more fragile appearance, are the brown abdominal hairs and the more variable appearance of the relative lengths of the fork-cells and their stems and the difference in the shape of the wings.

But the differences shown in the wings (figs. 7 and 9) are I think sufficient to separate this small *Anopheles* from the European *A. bifurcatus*.*

ANOPHELES AITKENII. n. sp. (James.)

A small mosquito of a uniformly dark colour and with unspotted wings. The following is Capt. James' description:—

“♀. Head black, with a few white spindle-shaped scales in front and long narrow deep brown forked upright scales behind. There is no marked frontal tuft of hairs; palpi covered with small black scales and with no trace of banding; antennae with long black hairs at the joints; proboscis brown.

“Thorax dark brown, with long brown hairs, but without scales; scutellum with long dark bristles. Abdomen black, without scales, but with many long brown hairs.

“Wings with the veins completely clothed with dark scales. The first sub-marginal cell is much longer and narrower than the second posterior cell.

“Legs brown throughout; the coxae are pale; there is no trace of banding on any of the joints; the hind first tarsal segment (metatarsus) is longer than the tibiae.

“*Habitat and observations.*—Collected by E. H. Aitken on the Goa Frontier and in Karwar (Bombay Presidency), in April. It differs from *A. immaculatus* in the complete absence of any markings on the palpi and legs.” (James.)

[This does not resemble my *A. immaculatus*, but it has a very

* The larva has recently been shown by Dr. Sargent to be distinct from *bifurcatus*.



Fig. 10.

Wing scales of *A. Aitkenii*.
n. sp. James.

strong resemblance to *A. bifurcatus* and *A. Algeriensis*, most like the former on account of the similar size, but it can at once be told by the striking dissimilarity in the size of the fork-cells, the second posterior not being much more than half the length of the first sub-marginal.—F. V. T.]

ANOPHELES IMMACULATUS. n. sp.

Thorax ashy-brown, with darker marks and pale hairs; abdomen brown, with golden hairs, most dense apically; palpi shorter than usual, brown, becoming ochraceous to almost white apically; legs brown, with ochraceous reflections, the tarsi dark in some lights, with pale apical bands; wings with ochraceous veins, unspotted.

♀. Head dark brown, with grey upright forked scales in front, ochraceous and darker ones behind, while narrow-curved scales in front form a more or less projecting mass, beneath which arises a tuft of long white hair-like scales; antennae brown, the basal joint bright testaceous, the next few joints with pale scales; palpi short for an *Anopheles*, rather thick, covered with dense brown, grey and ochraceous scales, the brown scales basal, the others forming most of the apical covering, the scales at the apices of the joints are slightly paler than the rest; proboscis about the same length as the palpi, ochraceous brown with a paler tip.

Thorax ashy-brown with slaty reflections, with darker longitudinal lines, one being median, the surface with pale golden, hair-like curved scales, a tuft of pale scales projecting over the head in front; scutellum ochraceous or slaty-grey according to the light, with narrow-curved, hair-like, pale golden scales, and brown border-bristles; metanotum deep brown.

Abdomen deep brown to black with golden hairs, which are very dense on the apical segments.

Legs ochraceous, with brown scales, scantily set on the femora, so that they appear dull ochraceous, the tarsi are darker, especially on the hind legs, which have the apices of the joints banded with ochraceous; to some extent this banding may be seen in the fore and mid legs; ungues equal, simple, deep brown, large for an *Anopheles*. Wings unspotted, with yellowish veins and pallid ochraceous scales; fork-cells rather short, the first sub-marginal longer and narrower than the second posterior cell, their bases nearly level, the stems longer than the cells; super-

numery and mid-cross veins apparently in one line, the posterior cross-vein about three times its own length behind the mid cross-vein; halteres ochraceous.

Length.—4 mm.

Habitat.—India. (Evidently from Goa.)

Observations.—Described from a single perfect ♀. It is clearly told from all known *Anopheles* by the unspotted yellowish wings. The palpi and proboscis are shorter than in most *Anopheles*. In some lights it has a distinct general ochraceous tinge. The specimen was given me by Capt. Liston. It will probably have to be removed from this genus.

Genus 2. MYZOMYIA. Blanchard.

GRASSIA. Theobald.

(Comp. Rend. Heb. Soc. Biolog., No. 23, p. 795, Blanchard;
Jour. Trop. Med. V., p. 181, 1902, Theobald.)

(Plates VI. and VIII.)

Thorax and abdomen with hair-like curved scales; there may be a few narrow-curved ones on the front of the mesothorax, forming a tuft, projecting over the head (Fig. 1, 2); wings with mostly long thin or narrow lanceolate lateral vein-scales; the wings are spotted, and they are usually small or moderate sized species.

The larvae mostly live in flowing water, very rarely in ponds or stagnant water, except *Rossii* and *superpictus*, which may breed even in pots and puddles. The palmate hairs are well developed except in *Rossii*. The species that inhabit flowing water have the eggs with large floats. This genus is the one most intimately connected with malaria, in India and Africa.

The name *Grassia* proposed by me for this genus has been previously used by Fisch (1885). Professor Blanchard re-named the genus *Myzomyia*.

A. *Proboscis banded*.

MYZOMYIA ALBIROSTRIS. n. sp.

Thorax slaty-grey in the middle, brown at the sides, with a dark median and lateral lines behind, with pale hair-like scales. Abdomen deep brown, with golden hairs. Palpi with two very broad pale apical bands and a narrow one towards the base;

proboscis with a broad pale apical band, nearly half the length of the proboscis. Legs deep brown with very narrow apical bands. Wings with the costa black, with three nearly equal sized yellow spots and a small basal one.

♀. Head deep brown, with white forked scales in the middle, black at the sides. Antennae brown, basal joints yellowish, with small grey scales; palpi with two broad yellowish-white apical bands, and a small one on the basal third, remainder with brown scales. Proboscis brown, with a very broad pale scaled apical band nearly half its length.

Thorax slaty-grey in the middle, brown laterally, with a median brown line and brown lateral lines behind, with scanty golden hair-like scales and a pale grey tuft of narrow-curved scales in front; scutellum dark in the middle, ochraceous at the sides, with golden hair-like scales and golden border-bristles; metanotum brown.

Abdomen blackish-brown, with golden hairs. Legs deep brown; apices of the joints with minute pale bands; unguis small, equal and simple.

Wings with the black costa with three almost equal yellow spots and with a trace of a small one nearer the base; the apex of the wing is yellow, with a dark patch at the junction of the lower branch of the first fork-cell with the costa. The apical and second black costal areas extend evenly on to the first long vein, the third nearly evenly on to the sub-costal, but the latter is represented by a black area only about two-thirds of its length on the first longitudinal; the next black area extends evenly on to the sub-costal and first long vein; the basal part of the first long vein is yellow; the small basal yellow spot is scarcely perceptible on one wing. The upper branch of the first fork-cell has a small black spot under the black apical costal spot and another small one towards its base about the middle of the next dark costal area, the lower branch has a long dark apical spot and a small dark spot under the spot on the upper branch; the stem has a black spot under the second costal pale area and another small one just past the cross-veins; the whole of the third long vein is yellow, except a small black apical spot; on the upper branch of the second fork-cell two small black spots, on



Fig. 11.

Palpi and proboscis
of *M. albistrois*, n. sp.

the lower branch one, the greater part of the stem dark scaled up to the cross-veins and another dark patch just past them ; the fifth is nearly all pale scaled, except for two dark spots on the upper branch and one on the lower ; the sixth has three dark spots ; wing fringe with a pale spot at the junction of each vein with the border, that at the apex of the sixth the largest ; the basal fringe area appears rather paler in some lights ; apex of the wing yellow except where the lower branch of the first fork-cell joins the costa ; first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem about two-thirds the length of the cell ; stem of the second posterior longer than the cell ; mid cross-vein nearly uniting with the supernumerary, the posterior a little way behind. Halteres with pale stem and fuscous knob.

Length.—2·5 mm.

♂. Palpi thin, last two joints much swollen, brown, last two apical joints with many pale scales, especially on their ventral surface, hairs golden ; antennae banded brown and grey, with flaxen brown plumes ; fore unguis very unequal, the large one uniserrated.

Wings with anterior border as in the ♀ ; the greater part of first fork-cell dark scaled, its base pale, a dark patch on the stem as in the ♀ ; the third long vein has also a dark patch at the base ; second fork-cell with a large dark patch on the upper branch, a small one below, the remainder mostly dark scaled, except at the cross-veins ; fifth with two dark spots on the upper branch, one at the base of the cell and another at its root. Sixth mostly dark scaled, with a pale area in the middle and one near the root.

Length.—2·5 mm.

Time of capture.—May.

Habitat.—Malay States (Dr. Durham).

Observations.—Described from two perfect specimens, but the male has shrunken palpi. One of the smallest species I know, and easily told by the apical part of the proboscis being pale. This is not, however, so clear in the ♂ as in the ♀, but the pale scaled area is broader in the ♂ than in the ♀, up to quite half the length of the proboscis. It might, on account of the banded proboscis, be confused with Dönitz's *N. deceptor* (p. 105), but the wings are quite different, and so are the palpal bands.

B. *Proboscis unbanded*.

MYZOMYIA LISTONI. Liston (not Giles)

Anopheles Christophersi. Theobald, 1902*Anopheles Listoni*. Liston, 1901.*Anopheles fluviatilis*. Christophers (MS.), 1901.

(Proc. Roy. Soc., p. 378, vol. lxi. (1902), Theobald; Ind. Med. Gazette, xxxvi., 12, Liston (1901).)

Thorax brown, with narrow, long, hair-like, pale golden scales, slightly darker at the sides. Abdomen dark brown, with golden hairs. Legs dark brown, unbanded, and with no knee or other spots. Palpi brown to black, with two broad apical white bands and a narrow one towards the base. Wings with the costa black, with four small yellow spots, the basal one rather

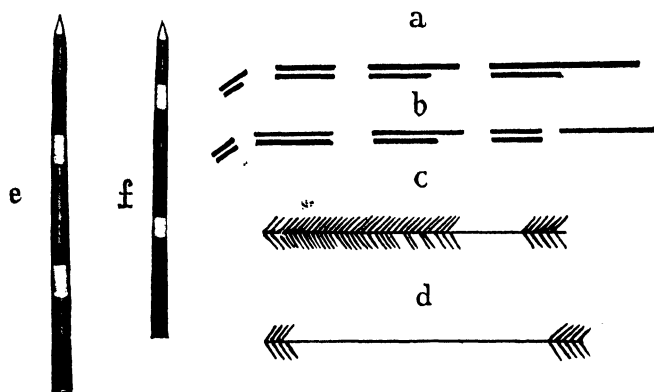


Fig. 12.

Myzomyia funesta and *M. Listoni*.a, Costal border of *M. funesta* (Gambia); b, Same from Sierra Leone; c, Third long vein of *funesta*; d, Of *Listoni*; e, End of ♀ palp in *Listoni*; f, in *funesta*.

indistinct, veins with rather long scales, the black ones being most prominent; fringe black, with four pale spots.

♀. Head dark brown, with broad white upright forked scales in front, black ones behind, and a dense tuft of white hairs projecting forwards; palpi dark brown, almost black, densely scaled, with a broad apical band and two narrower ones towards the base of the palpi; antennae bright brown; proboscis deep brown, with pale apex.

Thorax brown, with long, narrow, hair-like, golden scales and brown bristles; scutellum cinereous-brown, with a double row of border-bristles, the outer ones being large, the inner small; metanotum deep brown to black.

Abdomen almost black, with golden hairs. Legs completely dark brown, with bronzy reflections in bright light; ungues equal and simple.

Wings (fig. 13) with the anterior border black, with four small yellow spots, and the apex yellow, the basal spot very small; the yellow spots spread uniformly on to the first long vein except the third, which passes well under the black costal spot; scales of the veins mostly black; a yellow patch at the base of the fork-cells and on most of the third long vein, a long patch at the base and another towards the middle of the fourth vein; one large and one small patch on the upper and one large one on the

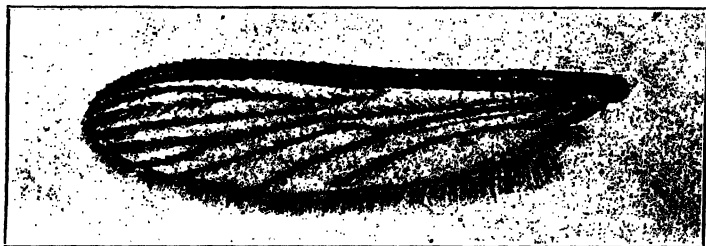


Fig. 13.

Wing of *Myzomyia Listoni* (♀). Liston (non Giles).

lower branch of the fifth vein, the stem mostly pale; most of the sixth dark, but there is a broad yellow line towards the base; fringe black, with yellow spots at the end of the veins, except where the sixth joins the wing border; first sub-marginal cell considerably longer and narrower than the second posterior cell, its base much the nearer to the base of the wing; its stem about half the length of the cell; stem of the second posterior about one and a half times the length of the cell; supernumerary cross-vein about half its own length in front of the mid cross-vein; the mid more than its own length in front of the posterior. Halteres with pale testaceous stem and black knob.

Length.—2.5 mm.

Habitat.—Duars (Christophers); Perak (Wright); North Canara district, India (E. H. Aitken).

Observations.—Described by me as *Christophersi* from two ♀'s

sent to the Royal Society by Drs. Christophers and Stephens, but just previously described as Giles's *Listoni* by Capt. Liston.

The species is very closely related to *M. culicifacies*, but has more than three pale fringe spots. The long black basal part of the costa is also very characteristic, as also is the pale third longitudinal vein.

The only other unbanded legged Indian species related to it are *M. culicifacies*, Giles, and *M. Turkhudi*, Liston; the first has the largest light costal area at the base of the wing and the forked scales of the head mostly dark in the ♀, and the ♀ palpi with two narrow rings and a white tip, and has only three pale fringe spots.

M. Turkhudi (and *M. Hispaniola*) differ in having the apex of the palpi black in the ♀.

M. Listoni is abundant in the malarious district of Duars, and is a prominent malaria bearer.

Synonymy.—The species described by Liston in the Indian "Medical Gazette" (vol. xxxvi. no. 12, Dec. 1901) as *A. Listoni*, Giles, is not Giles's *A. Listoni* at all—it is my *Christophersi* and the *fluvialis* used as a MS. name by Drs. Stephens and Christophers.

In Liston's figure there are given white spots at the knees and tibial joints; these do not show in any specimen I have seen, and I find in the text of his description "legs black throughout." Capt. Liston has gone over the specimens with me and we settled the synonymy between us.

Further notes.—Mr. Aitken took this species in a cow-house and also in a shed in which goats were kept. It is the commonest larva in rice-fields in parts of the Goa district. At Diggi, on one of the principal trade routes to Goa, Mr. Aitken found clerks and peons at the station suffering from malaria; close by he found the larvae of this species in great numbers, in a pool formed by a dam across a small stream where it was not shady.

The larva and its habits.—The larva has four simple frontal hairs like *culicifacies* (Fig. 17, f).

Mr. Aitken sends the following description of the larva:—

"The head and the thorax are broad, the abdominal segments decrease rapidly from the first to the last and are very sharply defined. The lateral bristles are long and stout. But the most definite mark is the shape of the thorax, which is not round or oval, but distinctly quadrilateral and broader behind than before. The back of the head is as broad as the front of the thorax, so

that the two together form a rough triangle. The colour is usually light greenish-brown, the head being darker.

"These larvae are very alert, diving on the least alarm and lying motionless on the bottom. If any mud is taken up with the water, it is most difficult to detect them, so patiently do they sham death. They do not seem to feed on *confervae* at all. If anything of the kind is put into the water with them, they are apt to entangle themselves and die, by drowning, I suppose. They feed either at the surface or at the bottom; for this reason, perhaps, they affect shallow, clear water. I found them in rice-fields and small rocky streams, but most abundantly in boggy ground adjoining rice-fields."

MYZOMYIA ACONITA. Dönitz.

(Beit. z. Kennt. d. Anop., p. 70, 1902.)

The following is Dönitz's description, translated for me by Miss Falcke:—

"*Diagnosis*.—Superior fork almost double the length of the inferior fork. Four typical spots on the anterior margin at equal distances one from the other; beneath the terminal half of the second spot there is a dark streak on the first longitudinal vein. There is no spot at the commencement of the third vein. Vein six has three spots, the central one, very long, is frequently amalgamated with the small radical spot.

The ciliated margin is parti-coloured. Legs equally dark, tarsal articulations, slightly lighter.

Ends of the palpi white, with a dark ring on the other side of the centre of the fourth palpal joint.

Description of a specimen from Kajoe Tanam, Sumatra:—

Head.—Tuft on vertex white. Palpi dark, with light terminations. The first joint has broad light markings, the end of the second joint, as also the terminal joints, light, the last but one has a fairly narrow ring about the middle. The terminal half of the proboscis is light. Length of joints of palpi, 0·5—0·5—0·3—0·13 mm.

Thorax (yellow in the alcohol) with a dark central streak right through. The grey field lying near is divided from the front to the middle on each side by an ochre-yellow longitudinal stripe. There is an olive-brown spot behind the sutura transversalis, while a stripe of the same tone, but somewhat lighter, goes over the roots of the wings in a backward direction. The side-fields thus ensuing are again divided longitudinally by a narrow darker stripe, which commences next to the above-mentioned longitudinal stripes of the anterior half of the thorax.

Metanotum ochre-yellow.

Wings.—The fork-cell of the second longitudinal vein lies perpen-

dicularly beneath the commencement of the third spot of the anterior margin; the fork-cell of the fourth vein is farther away in an outward direction, so that there is a very considerable difference in the length of the two superior forks, which is more remarkable than in *A. punctulatus*, *leucopus*, etc. The auxiliary vein terminates a little in front of the fifth longitudinal vein. The two central spots of the anterior margin are of about even length, the first and fourth only about half the length of these. In the radical part on the costa there are two small dark spots, of which the second of the specimen being described has amalgamated with the first typical spot. This, however, does not always take place. The typical spots of the anterior margins are divided by short light incisions; the last of these is only half the length of the other two. All four dark spots extend in equal length to the first vein with the exception of spot two, beneath the first half of which the first vein is not darkened. On the stem of the upper fork there is a dark spot immediately in front of the division, and there is a very small one at its commencement just under the centre of the second spot of the anterior margin. The place of division and the centre of the upper branch are light. The lower branch



Fig. 14.

Wing of *Myzomyia aconita*. (♀.

After Dönitz.

in its centre is slightly lighter; in other specimens, however, a considerable length is light. The third longitudinal vein only carries the marginal spot (the spots otherwise at their commencement before and behind the transverse veins are distinguished by isolated scales which are frequently hardly discernible through the microscope; this condition was more especially noted in specimens from Soekaboemi). The first third of the stem of the lower fork is light, then dark to the division, with a short light interruption at the transverse veins, which are arranged step-like: the spot of division itself is white; both branches dark, the lower one with a light centre. In other specimens the entire first half of the lower branch is light and the centre of the superior branch may become light. The fifth vein has only a radical and marginal spot, its branch is dark over half its extent and only interrupted by the light surroundings of the inferior transverse vein. The sixth longitudinal vein has a very long central spot and a very small radical spot which may become confluent with the central spot. The marginal points are mostly lengthened out to streaks.

The light spots are light yellow ochre at the anterior margin, more grey on the area of the wings.

The ciliary margin is distinctly parti-coloured, the light yellow cilia of the tips of the wings on the upper fork are sharply bisected with dark. On the posterior margin a long white place situated beneath the central spot of the sixth vein in the ciliary margin is noted.

Index of the auxiliary vein, 40·4; of the fifth vein, 37·3.

Halteres, brown, with a lighter stem.

Legs of an uniform dark colour; tarsal articulations only slightly lighter, not annulated. The femora of the first pair are not thickened at the commencement.

Head and Proboscis.—2·0 mm.

Trunk.—3·0 mm.

Wings.—2·7 mm.

Habitat.—Sumatra (Kajoe Tanam), Java, Willem Island, Soekaboemi."

Notes.—This is clearly a distinct species; unfortunately it is described from a spirit specimen, and thus the important squamose characters are unknown. It is clearly allied to *M. Listoni*, Liston, but differs notably in the palpal banding. It also bears a strong resemblance to my *M. leptomeres* on account of the similarity of the fork-cells, but the differences in the wings at once separate them.—F. V. T.

ANOPHELES (? MYZOMYIA) HEBES. Dönitz.

(Beit. z. Kennt. d. Anop., p. 84, 1902).

The following is Dönitz's description, translated by Miss Falcke :—

Diagnosis.—Vein two forks off earlier than vein four.

The four spots of the anterior margin extend to vein one.

There are only a few whitish places strewn over the faint brownish-grey scaled veins. The fifth vein is whitish, with a dark root spot, a dark patch at the forking and border spot. On vein six only one long, fairly dark, central spot.

Ciliary edge faintly parti-coloured. The first and second palpal joints white, terminal joint white. The last but one palpal joint is three times the length of the last joint. Description of a specimen from Dar es Salaam.

Very small species with wings of a dull tinge.

Head.—Olive-brown, with grey frons and a vertex covered with grey scales. Palpi : Length of separate joints, 0·6—0·7—0·3—0·1. The first and second joints covered with white scales. The end of the third joint is dark, the fourth joint quite white. Palpi and proboscis of equal length.

Antenna have grey scales on the first joints.

Thorax.—The membrane on both sides of the dark median line

exhibits bluish slate-grey stripes, the remaining parts are olive-brown, with a dark spot in front of the sutura transversalis. Scales rubbed off.

Wings.—The upper fork starts beneath the commencement of the third marginal spot; its lower branch is about double the length of the lower branch of the inferior fork. The second spot of the anterior margin is the largest, the first and third are not much smaller, but the fourth is considerably smaller. The patches extend to the first vein in equal lengths, only beneath the second patch the darkening of the first vein begins somewhat later. The remaining veins are principally covered with dull brownish-grey scales bestrewn with a few lighter, whitish places; the whole extent of the fifth vein is whitish, except for a dark spot at the root, the fork cell and the end (marginal spot). There are white spots on the central cross-veins; at the division of the two upper forks; on vein three there is a longish streak in front of the marginal point, and at the commencement of the second and fourth veins.

The sixth vein carries dark scales on the terminal half as the central and marginal spots are amalgamated; it has no root spot. The marginal points are hardly distinctive from the other scale-structure. (In photo-



Fig. 15.

Wing of *A. (Myzomyia) hebes*. (♀).

After Dönitz.

graph table I., fig. 1, the root spot of the fifth vein is missing, because at this place it was rubbed off in the preparation.) The upper branch of the superior fork is somewhat darkened over its entire course, but not sufficiently so to contribute to the widening out of the two last spots of the anterior margin.

The two inferior cross-veins are very oblique, the superior one touches the central one at an angle at the root of the wing, the inferior one is as far distant from the central one as its length. In other specimens the lower cross-vein is vertical; the upper one can be either near or distant to the central one.

The ciliary margin is distinctly piebald, particularly at the apex, which is moreover distinguished by a particularly light spot beneath the spot of the anterior margin. Index of the auxiliary vein, 40·8; of the fifth vein, 35·2; in other specimens the numbers are 40·0 and 35·3. Length of wings, 2·7 mm. and 2·5 mm.

Legs have greyish-brown scales; lighter scales sparsely bestrew the femora and tibia; tarsi somewhat darker; joints only slightly lighter.

Abdomen.—The venter appears to have a dull light marking.

Head with proboscis.—2·2 mm. and 1·7 mm.

Thorax and abdomen.—3·4 mm. and 3·4 mm.

Habitat.—East Africa: Dar es Salaam. Collected by Staff-Surgeon Dr. Zupitza in Mballa Plain in May, 1898. South-west Africa: Insiza. Collected by Dr. Zupitza in February, 1899.

Remarks.—A very small variety, which, according to the description, bears some resemblance to *A. rhodesiensis*, Theobald, but which is differentiated therefrom by its piebald ciliary margin."

Note.—This is evidently a distinct species, differing from my *Rhodesiensis*, mainly in the ♀ palpi.—F. V. T.

MYZOMYIA FUNESTA. Giles.

Anopheles funestus. Giles.

(Mono. Culicid. I., p. 178, 1901.)

(Plate II.)

Additional localities.—British Central Africa (Daniels); Lagos (Strachan); Gambia (Dutton)

Time of capture.—November at Lagos; December in Gambia (Dutton).

Varieties of *M. funesta*.

This species is very variable, but there seem to be two main varieties in West Africa, as follows:—

Variety UMBROSA. n. v.

Costa black at the base, unbroken by the typical small pale spot. Veins with dusky scales predominating, the pale scaled areas restricted to the region of the cross-veins and bases of the fork-cells and on the fifth long vein; *the third long vein dark, as in Rhodesiensis*. Wing fringe spotted as in the type.

Gambia (Dr. Dutton) (*vide* Plate II.).

Variety SUBUMBROSA. n. v.

Costa black at the base, unbroken by any pale spot. Dusky scales predominating, but not contrasted, as in the type, with the pale scaled areas. *Third long vein pale scaled in the middle*, and pale scaled areas also on the fourth, fifth and sixth.

Gambia (Dr. Dutton).

Observations.—This African species comes very near the

Indian *Listoni* of Liston, but can at once be told by, (1) the palpal banding being different, the three white bands in *M. funesta* being unevenly disposed, the two apical ones being nearer together than in *Listoni*. The latter species has also a very prominent white scaled third long vein; in *M. funesta* it may be entirely dark or may have a white patch, but is never so markedly pale as in the Indian species.

This species occurs in abundance in the native huts on the coast of Gambia, and Dr. Dutton found many on the walls of the prison at Bathurst and in the Governor's house. "Both at Baia and McCarthy's Island there were no ordinary or artificial breeding grounds," writes Dr. Dutton, "except here and there a large marsh. At Baia the marsh was about two miles away from the town. At the Cape, seven miles from Bathurst, this small *Anophele* occurs in numbers and the larvae were found in rice swamps."

In the first volume of this book (p. 180 and 186), I pointed out that the difference between *funesta* and *Rhodesiensis* could be detected by the different position of the cross-veins. This does not hold good, for I have found the cross-veins in both vary so much that the characters are no good whatever in these two species. They are very distinct, however, for not only do the palpi present different characters, but the veins in *Rhodesiensis* are all dusky scaled, and there are no fringe spots, and the wings are always black at the base of the costa, whereas in *funesta* there is usually a pale costal spot near the base. *Funesta* is also smaller than *Rhodesiensis*.

MYZOMYIA RHODESIENSIS. Theobald.

Anopheles Rhodesiensis. Theobald.

(Mono. Culicid. I., p. 184, 1901.)

Notes.—An important character separating this species from *M. funesta* is that the palpi of the ♀ are thin and dark coloured, there being two narrow pale bands visible, the apical portion dark, with traces of a few pale scales at the base of the apical joint; they are much longer and thinner than in *funesta*. This comes, therefore, near *Turkhudi*, from which it differs in having only two prominent palpal bands and in wing ornamentation.

Additional locality.—Naniumba, Uganda (per Dr. Daniels). I have not yet seen this species from the coast.

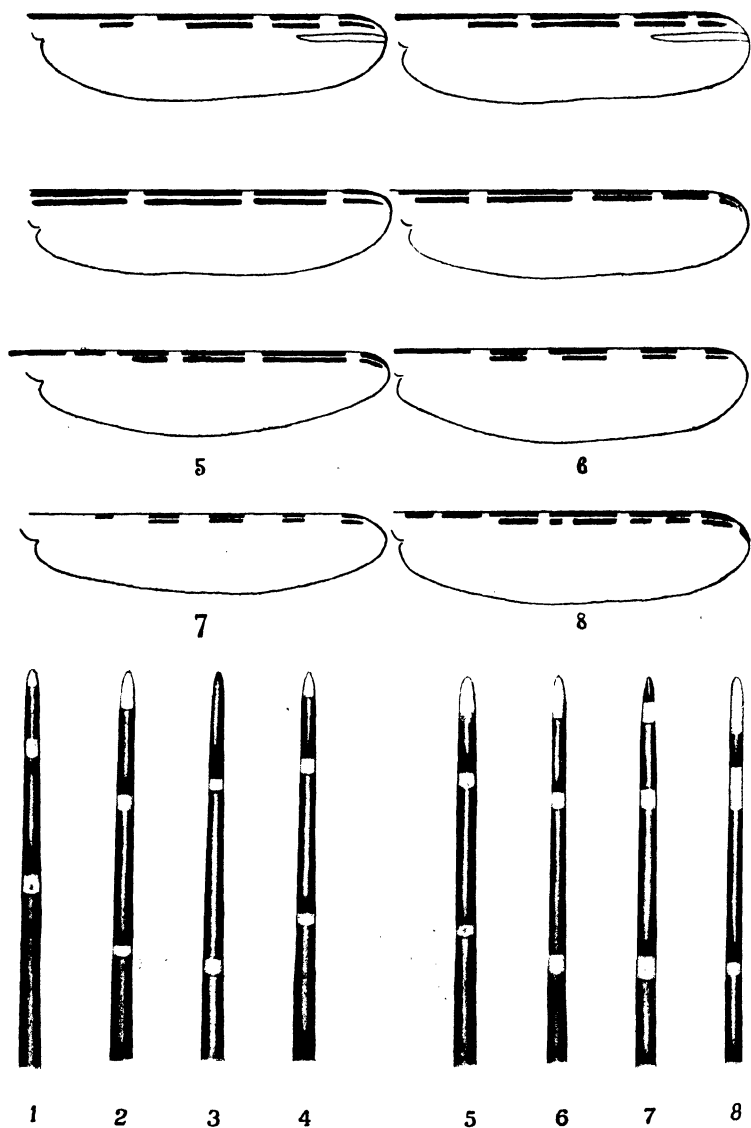


Fig. 16.

Costal markings and ♀ palpi of *Anophelina* (diagrammatic).

1, *M. funesta* (var.); 2, *M. Listoni*; 3, *M. Rhodesiensis*; 4, *M. culicifacies*; 5, *P. Jeyporensis*,
 6, *P. superpictus*; 7, *P. Chaudoyei*; 8, *P. Marshallii*.

MYZOMYIA LONGIPALPIS. n. sp.

Thorax cinereous in the middle, with a few narrow-curved pale scales and golden hairs, sides dark rich brown; pleurae brown. Abdomen black unbanded. Palpi long and thin, black, with three narrow white rings, apex white. Legs black, their bases pale brown, fore and mid unbanded, the hind with narrow yellow apical and basal bands. Wings mostly brown scaled, the black costa with four almost equal yellow spots.

♀. Head brown, with narrow grey scales; palpi long and thin, black, the apex with a white band, the base of the apical joint and the apex of the penultimate white, forming a second white band and another white band at the junction of the penultimate and antepenultimate joints; the palpi are as long as the proboscis, which is black with a pale apex and nearly as long as the whole body; antennae brown.

Thorax brown, with a cinereous sheen in the middle, the sides showing a deeper brown; with a few narrow-curved, pale scales and golden hairs, a dense tuft of long white scales in front, with a median division; scutellum pale, with a few pale scales and brown border-bristles; metanotum deep brown; pleurae brown.

Abdomen black, with brown hairs. Legs black, their bases pale brown; the fore and mid pairs unbanded, the hind with narrow apical and basal yellow bands to the tarsi and metatarsi; unguis equal and simple.

Wings densely scaled with long, thin, lateral scales, with the dark costa with four nearly equal pale yellow spots, which extend evenly on to the first long vein, except the basal one, which is continued to the base of the wing on the first long vein; the apical fringe of the wing is yellow with a small black spot, the yellow colour spreading on to the tip of the first long vein and on to the upper branch of the first fork-cell; veins dark scaled except for small yellow areas as follows:—at the tips of the fourth and fifth veins, at the base of both fork-cells and at the cross-veins, a long pale area on the lower branch of the fifth and one on its stem, two pale areas towards the base of the sixth; fringe dark except at the ends of the veins, no pale spot at the sixth; first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing; its stem more than half the length of the cell; stem of the second posterior longer than the cell; supernumerary and mid-cross

veins nearly in one line, the posterior a short way behind the mid ; halteres with ochraceous stem and fuscous knob.

Length.—5 mm.

Habitat.—Zomba, British Central Africa (Dr. Gray).

Time of capture.—January.

Observations.—Described from a single ♀ in fair condition, but with damaged head. The hind legs only are banded ; it resembles to some extent *cinereus*, but the darker wings and three white rings, instead of four on the palpi, should separate it.

MYZOMYIA LEPTOMERES. n. sp.

Thorax brown, with small hair-like pale scales and short golden hairs. Abdomen black, with pale golden-brown hairs. Palpi black, apex with a broad white band, another small white band near it on the apex of the joint, and another nearer the base. Wings with two yellow costal spots and traces of a third, base of first long vein white, greater part of the rest of the wing dark scaled ; fringe spotted.

♀. Head dark brown, with grey upright forked scales above, black at the sides ; antennae brown with pale pubescence ; proboscis brown with pale apex ; palpi black, the apex with a broad white band, and with two other small white bands on the apices of the joints.

Thorax brown, with a greyish sheen, with pale narrow hair-like scales and golden hairs ; scutellum pale brown ; metanotum dark brown ; pleurae with grey sheen ; abdomen blackish, with golden hair-like scales.

Legs black, unbanded. Wings with two yellow spots on the black costa, which extend on to the first long vein, base of the first long vein white ; wing scales thin, brown except at the apices of the veins, at the base of the second fork-cell, and at the cross-veins and on the lower branch of the fifth long vein ; apex of the wing yellow with a small black spot, fringe with pale areas where the veins join the border ; halteres with pale stem and fuscous knob. First sub-marginal cell much longer and narrower than the second posterior cell, its base much nearer the base of the wing than that of the latter ; its stem nearly as long as the cell ; stem of the second posterior cell nearly twice as long as the cell ; posterior cross-vein some way behind the mid cross-vein, the mid a little way behind the supernumerary.

Length.—3 mm.

Habitat.—India (Christophers).

Observations.—Described from a single ♀. It is nearly the smallest *Myzomyia*. The two wings are not uniform, one shows traces of an accessory costal spot; the pale area at the base of the first long vein is characteristic, as are also the fork-cells, but the latter resemble those in *M. hebes* (p. 32). The wing markings, however, readily separate the two insects.

MYZOMYIA CULICIFACIES. Giles.

Anopheles culicifacies. Giles. ♀.

Anopheles Listoni. Giles.

Anopheles Indica. Theobald.

(Mono. Culicid. II., p. 310.)

♀. Head covered with brownish-black, grey, and ochraceous brown upright forked scales; the dark ones being posterior, frontal tuft rather small; antennae brown, with pale bands, the basal and second segments testaceous; hairs brown; proboscis brown, apex testaceous; palpi brown, with three almost equal small yellow bands: one situated at the apex, the other two at the junction of the segments; the apical pale band is slightly the largest.

Thorax dark brown, with narrow, very pale golden-brown hair-like scales, dark brown pleurae; scutellum pale brown; metanotum chestnut brown.

Abdomen as described in Vol. II., p. 310.

Legs unbanded deep brown; coxae and trochanters pale brown; all the tibiae have an apical pale spot almost yellow in hue.

To the description of the wing previously given add, "a pale spot near the base of the second long vein, another at the base of the third, and another beneath it on the fourth long vein, almost in a line with the spots on the branches of the fifth; the fringe is not unspotted normally, there being two pale areas where the lower branch of the fourth and the upper branch of the fifth join with the costa." In some specimens there is an additional small pale spot at the base of the costa, and in others the base of the first long vein is pale, while sometimes it is spotted with black. (*Vide* Plate III.)

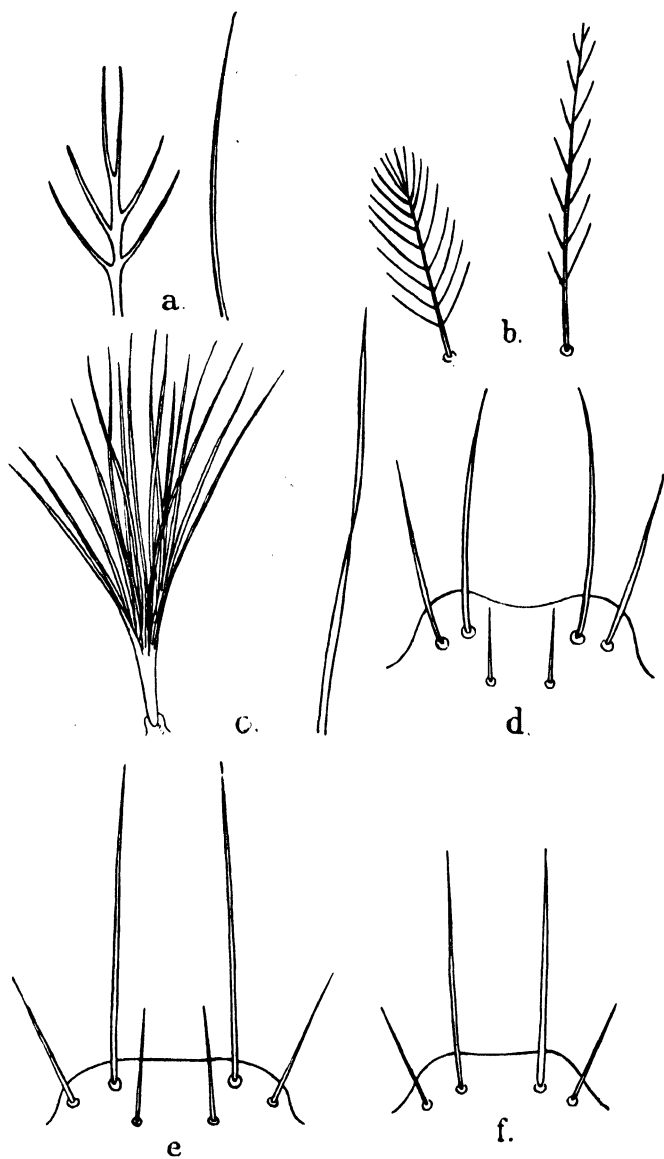


Fig. 17.

Frontal hairs of *Anopheles* larvae.

a, *C. pulcherrimus*; b, *N. fuliginosus*; c, *M. nigerrimus*; d, *M. culicifacies*; e, *N. Stephensi*; f, *M. Listoni* (after Christophers and Stephens).

♂. Unknown.

Synonymy.—The specimens described by Giles came from Captain Liston, I.M.S. He has examined the types for me, and assures me the fringe had two pale areas, and in some he showed me they had clearly there two pale spots, others had them faint, others not at all; it seems that in this species the fringe spots fade. It is thus clearly evident, and I am fully convinced from a

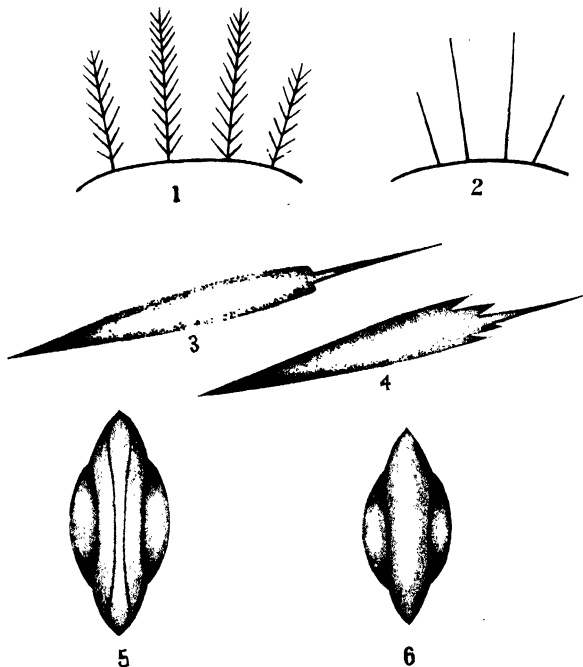


Fig. 18.

1, Frontal hairs of *P. Jeyporensis*, n. sp.; 2, of *M. culicifacies*, Giles;
3, Palmate hair of *culicifacies*; 4, of *Jeyporensis*; 5, ovum of
culicifacies; 6, of *Jeyporensis*.

re-examination of my type of *Indica* and Giles's types of *Listoni*, that they are the same. Moreover, Captain Liston recognised his specimens described by Giles as *A. Listoni* as being the same and having the same peculiar mode of resting as in the type specimen of *culicifacies*. The ♂ type of Giles is not the same species; it is a ♂.—*M. Turkhudi*, of Liston.

Notes.—There is some resemblance between *M. culicifacies* and *M. Listoni* (Liston), but the former can always be told by

the third long vein being black, by having only two fringe spots and an additional white costal spot.

Variation in the cross-veins.—Captain James sends me preparations of four wings of this species in which we see four quite distinct positions in the cross-veins.

The male unguis were wrongly described by Giles ; his male being a male *Turkhudi*, and not a male *culicifacies* at all.

The genitalia is similar to that of others in this group—the claspers being short and thick and terminate in a blunt point.

The larva of *culicifacies* has simple unbranched frontal hairs (Fig. 17, d), and can thus be readily separated from Grassi's *superpictus* (Fig. 4, c.).

MYZOMYIA LUDLOWII. n. sp.

Palpi deep brown, the apex broadly white banded, another small band close to it and a third much lower down ; proboscis deep brown, with distinct creamy white tip. Thorax fawn coloured in the middle, dark brown at the sides, with a median and lateral dark lines and curved hair-like pale scales ; abdomen brown, with pale hairs. Legs mottled and spotted with yellow ; tarsi apically and basally pale banded. Wings with four large costal spots and one or two small basal ones, most of the veins of wing area pale scaled.

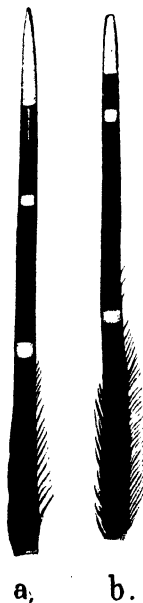


Fig. 19.
a, ♀ palp of *M. Rossii*;
and b, *M. Ludlowii*.

♀. Head pale brown, with narrow pale scales and pale and brown upright forked ones, a pale median tuft projecting forwards ; antennae brown, basal joint pale ferruginous ; proboscis deep brown, apex creamy ; palpi deep brown, with a broad creamy apical band, and near it another narrow pale band, the remainder divided by another narrow pale band, base densely dark scaled.

Thorax fawn-coloured in the middle, dark brown at the sides, with a median dark line and a narrow dark line on each side of the pale area, with scanty hair-like curved pale scales and traces of a dark spot before the scutellum, which is pale brown, with narrow hair-like scales ; pleuræ brown, mottled with grey.

Abdomen brown, with narrow curved hair-like scales and pale posterior border-bristles.

Legs brown, the femora and tibiae and metatarsi, especially in the hind legs, spotted with yellow; tarsi with broad apical and basal pale banding, especially on the hind legs; ungues small, equal and simple.

Wings with four large dark costal spots and two small basal ones, the apical spot small, extending evenly on to the first long



Fig. 20.

Wing of *Myzomyia Ludlowii*. ♀. n. sp.

vein; this is followed by a pale area nearly twice as long as the black apical spot. The second black spot is about the same length as the preceding pale one and spreads evenly on to the first long vein; the next pale area is slightly longer. The third black spot is the largest, and spreads nearly evenly on to the sub-costal vein, whilst beneath it on the first longitudinal is a large black line and

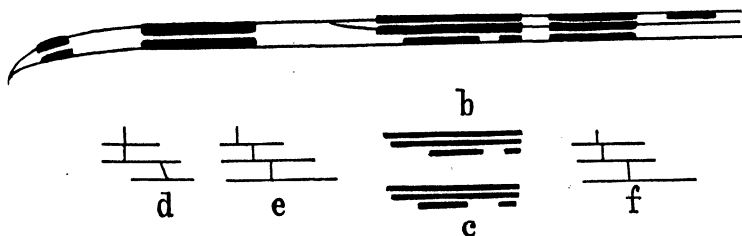


Fig. 21.

Myzomyia Ludlowii. n. sp.

a, b, c, Showing variation in wing markings; d, e, f, in cross-veins.

then a small pale area followed by a small black spot, the black line not beginning directly under the costal spot. The fourth black spot is separated from the third by a very small pale area, and extends evenly on to the sub-costal and first longitudinal; at the base is another small black spot. The second long vein has dark scales on each side of the cross-vein and a dark spot on the upper branch of the fork-cell under the apical costal spot, and another

small one near its base ; the lower branch has an apical spot and a larger one near its base. The third long vein has a black apical spot and a dark patch on each side of the cross-veins ; the fourth is mainly dark on each side of the cross-veins, and has two dark spots on the upper branch, one near the base and two on the lower branch ; the fifth has a black spot at its root, three on the upper branch and one at the apex of the lower branch ; the sixth has two dark spots. The first sub-marginal cell is a little longer and decidedly narrower than the second posterior cell, its base slightly nearer the apex of the wing than that of the second posterior cell, its stem as long as the cell ; stem of the second posterior considerably longer than the cell ; supernumerary and mid cross-veins in one line, the posterior rather more than twice

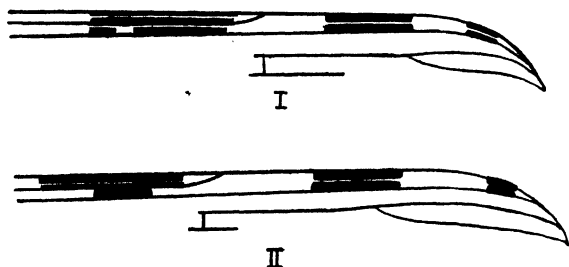


Fig. 22.

First three costal spots of I, *M. Ludlowii*, n. sp. ♀ ; II, *M. Rossii*, Giles, ♀.

its length distant from the mid, but very variable, sometimes step-like ; fringe with pale spots.

Length.—4 to 4.8 mm.

Habitat.—Luzon, Philippine Islands (Miss Ludlow).

Time of capture.—April.

Observations.—Described from a number of specimens. A very variable species, somewhat like *Rossii* at first sight, but easily told by the spotted legs and much shorter fork-cells. The base of the first sub-marginal is always slightly nearer the apex of the wing, and the costal spots differ slightly, but are to some extent variable. The cross-veins are most unstaple. The palpi are very similar, but the apical band in *Rossii* is rather longer. The chief difference is that in *Rossii* the second white band is a third of the way down the palpi ; in this species it is less, and the black intervening area is much smaller (*vide* Fig. 19).

MYZOMYIA ROSSII. Giles.

Anopheles Rossii. Giles.

Anopheles vagus. Dönitz.

(Mono. Culicid. I., p. 154, 1901 (Theobald) ; Beit. z. Kennt. d. Anop., p. 80
(= *vagus*) (Dönitz.)

(Plates III. and VI.)

Additional localities.—Mukerian, Hoshiarpur, India (Datta) ; Mozufferpur, Behar, Bengal (Green) ; Penang (Freer) ; Perak (Wright) ; Dacca (Macrae) ; Etawah, N.W.P. ; Canara District, Goa Frontier (E. H. Aitken) ; Kuala Lumpur, Malay States (Durham) ; Sumatra, Padang (Dönitz).

Time of capture.—October in rice-fields at Mukerian ; bred from larvae in February in Perak.

Variation in cross-veins.—Captain James sends me the following note *re* the cross-veins : “The cross-veins in *Rossii* are now found to vary considerably. Four well-marked types may be noticed (i.) in which the mid cross-vein is nearly its own length away from the supernumerary ; this is the normal disposition ; (ii.) the supernumerary and mid join and form one line, the



Fig. 23.

Wing of *Myzomyia Rossii*. ♀. Giles.

posterior more than twice its own length from the mid ; also very abundant ; (iii.) the supernumerary and mid nearly join, and (iv.) the supernumerary and mid join, but form an angle.” I have been unable to note this myself in numbers of specimens examined, however.

Captain Liston also writes regarding this subject as follows : “I have examined many thousands of *Anopheles* in India, and especially many hundreds of *Rossii*. In this latter species, I made a special study of the cross-veins and size of the fork-cells, and I found that these varied exactly as you have found in the *sinensis* group.”

General Notes.—The larva of this species, according to Mr. E. H. Aitken, when young is “brown, with a blackish head

and white collar. When full grown the colour is variable, light brown, almost black or greenish, the head being generally mottled brown. Just before becoming a pupa it turns pale and looks very fat and smooth ; at this stage I have taken it," says Mr. Aitken, "for a different species."

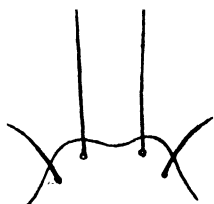


Fig. 24.

Frontal hairs of larva of
M. Rossii.

The frontal hairs are simple filaments, much as in the larva of *Chaudoyei*.

They feed generally on the surface, but dive now and then. They greedily devour the dead bodies of their own species, and will kill and eat weakly specimens. Col. Giles's figure of the frontal hairs (fig. 4, a) is quite wrong ; they are as shown in fig. 24.

Synonymy.—Dönitz recently described this species as *A. vagus*, from Sumatra. It is certainly only *Rossii* (Giles) ; the characters by which Dönitz separated it shows he has not examined a large series of *Rossii*. My figure of the wing also seems to have intentionally misled him. There is a small spot on both sides of the cross-veins on the third vein ; unfortunately, in my description, and also in the figure, I omitted this. It is not, however, always present, but is certainly typical. The type specimens of this insect which I re-described were not very good specimens.* The presence of the small wing spot seems to have formed one character of Dönitz's *vagus*. If he had consulted the second edition of Giles's book, he would have seen this figured (Fig. 11 ; Plate IX.), yet not the one on the other side of the cross-vein ; this I have also seen absent. My figure (No. 115, Vol. I.) should have, as usual, the sub-costal ending after the T-shaped spot, not as it is there drawn.

The spotting of the wing is subject to some variation ; the typical form is shown, however, in the figure (p. 45) taken from a photograph given here. The spots on the wing fringe vary, as I have pointed out elsewhere, they evidently fade from what collectors have told me ; the one at the end of the sixth vein frequently seems to be absent. (*Vide* also Plate III.)

* One type actually proved to be not even a true *Anopheles*, but constitutes a new genus *Aldrichia*.

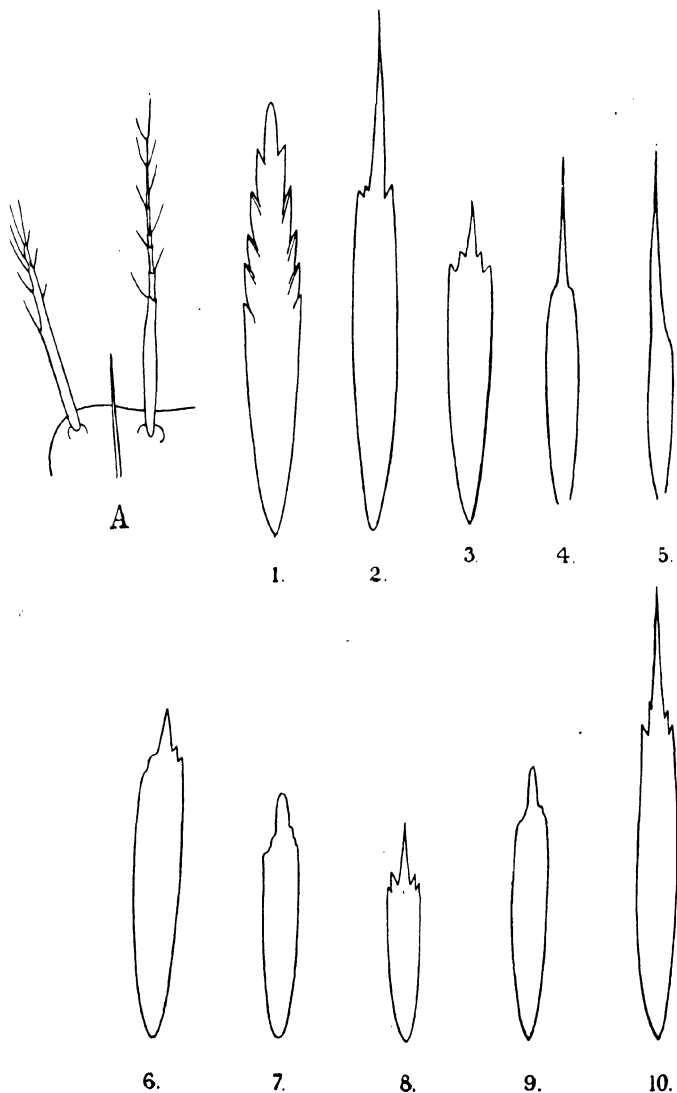


Fig. 25.

✓ Palmate hairs of *Anopheles* larvae.

1. *M. barbirostris*; 2. *N. fuliginosus*; 3. *N. Theobaldi*; 4. *M. culicifacies*; 5. *M. Rossii*;
 6. *N. Stephensi*; 7. *M. Turkhudi*; 8. (?); 9. *N. maculipalpis*; 10. *M. Listoni* (Liston).
 (8. *N. Theobaldi* of Giles.)

A. Frontal hairs of *N. maculipalpis*. (After Christophers and Stephens.)

MYZOMYIA TURKHUDI. Liston.

Anopheles Turkhudi. Liston.

Anopheles culicifacies. ♂. Giles.

(Ind. Med. Gaz., Dec. 1901, p. 441.)

(Plate III.)

♀. Head covered with dark upright forked scales and a small creamy frontal tuft; antennae brown, with paler bands and with light and dark hairs; palpi deep black, with the *tips* broadly *black scaled*, with three white bands on each palpus; one of these white bands is placed about the middle of the terminal segment, the other two are placed at the joints of the second and third segments of each palp. Proboscis deep brown, pale at the apex.

Thorax deep brown, covered with pale hair-like, almost golden scales; the sides dark brown; there is a narrow median dark line.

Abdomen deep brown in old specimens, dark olive green in fresh specimens, with pale hairs of a dull golden tint.

Legs deep brown, unbanded, paler at the base and beneath the femora; tips of the femora and tibiae pale.

Wings (Plate III.) with six pale areas on the costa, the two basal ones small, the second and third black spots the largest, the yellow markings are continuous on to the first long vein, and there is a small yellow spot on it under the third and largest black spot; the branches of the fork-cells mostly black scaled, a pale patch at the base of each cell; the third vein is mostly pale with a small dark spot at the apex and one on each side of the cross veins; there are pale areas over the cross-veins, and a large pale area on the lower branch of the fifth, and another towards its base, and two small pale areas on the sixth towards the base; the fringe is dark, but there are pale spots where all the veins join the costa except at the sixth; halteres pale with slightly fuscous knob.

♂. Described previously as the ♂ of *M. culicifacies*.

Length.—5 mm.

Habitat.—Ellichpur, India (Liston).

Observations.—This species is very distinct, the black apices to the palpi at once separating it from all the rest of this group except *M. Hispaniola*. Captain Liston figures the third long vein dark, the specimen described here has it mostly yellow; all intermediate stages exist.

The egg is like a *Culex* egg, without any floats; the only *Anopheles*-like character is a rudimentary frill enclosing an oval area about one-fourth the length of the egg. The eggs are laid in a heap, as in most *Anopheles*, before they are distributed on the water, and not in anything like a raft shape. The larva is also somewhat *Culex*-like, adopting an attitude at an angle to the surface of the water. It also differs from all other larvae in only having three pairs of palmate hairs; it has also an additional large pair of hairs on the head.

MYZOMYIA HISPANIOLA. n. sp.

(Plate IX.)

Very closely allied to *Turkhudi*, but at once told by the larger black apex to the palpi.

♀. Head brown with upright brown forked scales, with greyish tips and a wedge-shaped area of creamy-grey ones in the middle, a tuft of grey scales projecting between the eyes in front; palpi brown, with three pale bands involving both sides of the joints, the apical band being very small, the greater part of the apical joint being black. Antennae brown with narrow pale bands, last two joints slightly swollen; proboscis deep brown, apex paler. Thorax slaty-grey in the middle with deep rich brown sides, about the middle of each brown area a deeper brown eye-like spot, covered with sparse curved hair-like scales; scutellum paler with rich brown border-bristles; metanotum brown, shiny. Abdomen blackish-brown, paler ventrally, with numerous pale golden-brown hairs. Legs deep brown, tarsi unbanded, apices of all the femora and tibiae with a pale yellow spot; unguis small, equal and simple. Wings with five black costal spots, the basal area being black, the first two apical spots being continued evenly on to the first long vein, the third broken, the smaller spot being basal, the fourth having a black patch under its anterior two-thirds, the base of the first long vein pale, upper branch of the first sub-marginal cell dark scaled except at the apex and base, the lower mostly dark scaled, but with a small pale spot near the apex and at the base, stem

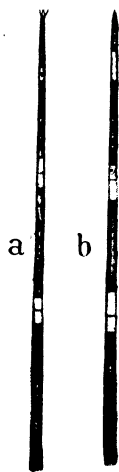


Fig. 26.

Palpi of *M. Hispaniola*
and *M. Turkhudi*.

up to the cross-veins yellow, behind them brown ; third long vein yellow except at the base and apex ; upper branch of the second posterior cell with two large black spots, greater part of its lower branch dark, base of the cell yellow, the stem mostly dark scaled ; upper branch of the fifth with three dusky spots, lower branch dusky at the apex, pale otherwise ; sixth with three dusky spots ; fork-cells rather short, first sub-marginal longer but slightly narrower than the second posterior, its stem as long as



Fig. 27.

Wing of *Myzomyia Hispaniola*. n. sp. (♀.)
(Wing to show neurulation only.)

the cell, stem of the second posterior very slightly longer than the cell ; the mid cross-vein not quite its own length nearer the base than the supernumerary ; posterior cross-vein nearly twice its own distance from the mid ; fringe brown, with pale spots where the veins join the costa except at the lower branch of the fifth and at the sixth ; halteres with thin pallid stems and fuscous knobs.

Length.—5 mm.

♂. With the last two palpal joints swollen, their apices white, remainder brown ; the last two joints with a few lateral brown hairs, the apex of the antepenultimate with a more or less dense tuft ; antennae banded brown and grey, with rich brown plumes ; male claspers long, with minute black apex ; all the unguis equal and simple.

Length.—5 mm.

Habitat.—Spain (Macdonald), per Dr. Thin ; Teneriffe (Dr. Grabham).

Time of hatching.—December in Teneriffe.

Observations.—Closely related to Liston's *Turkhudi*. It can be told from *Turkhudi* by the black apex being much broader, and by the third long vein being mostly pale scaled instead of black, and by the base of the wing having a long black costal spot, which in *Turkhudi* is broken by a small pale area.

This is evidently the species that Macdonald called *A. pictus*.

Dr. Grabham has bred this species from larvae collected in some of the large reservoirs above Santa Cruz, which are rarely without water. The adult insects were not met with in houses. They bite and suck blood. The Teneriffe specimens are somewhat darker than the Spanish ones, but the wing ornamentation is practically the same.

MYZOMYIA LUTZII. Theobald.

Anopheles Lutzii. Theobald.

(Mono. Culicid. I., 1901, p. 177.)

Notes.—This species was wrongly recorded by Dr. Durham in his "Report of the Yellow Fever Expedition to Para, 1900," p. 50. The species was *Stethomyia nimba*, from the description he gives of it. His collection contained the latter species as well as *Lutzii* and *argyrotarsis*.

Dr. Low sends the following notes *re* this species: "We arrived at Coriabo half an hour before dusk. As we were sitting at dinner in the verandah of a hut large numbers of this species appeared, and bit with great readiness. They were first seen just as it got dark, and they disappeared again about two hours afterwards; their attitude when at rest was almost at a right angle with the surface on which they settled—the so-called typical *Anopheles* position. Two policeman (black) who resided there suffered much from malarial fever, but whether this or some other *Anopheles* was responsible I do not know. *Allbipes* and *argyrotarsis* were not seen there."

Additional localities.—Para, Brazil (Dr. Durham); British Guiana (at Coriabo, Barima River) (Dr. Low).

MYZOMYIA (?) ELEGANS. (n. sp., James).

Possibly a variety of *leucophyrus*. The following is Captain James's MS. description:—

A dark mosquito the wing veins of which are thickly clothed with rather broad spindle-shaped black and white scales, which form numerous small spots on the wing field, so that the wing has a beaded or mottled appearance. Legs thickly mottled with black and white scales. Palpi with four white bands. Abdomen with long golden hairs but no scales. Thorax with creamy scales and hairs.

♀. *Palpi* scaled and with four white bands; the three outer bands are broad and equal, the innermost band is narrow; tips of the palpi white.

Proboscis brown with lighter tip.

Head with broad white forked scales in front and dark ones behind; with a scanty tuft of long white hairs projecting forwards.

Antennae brown with white hairs.

Thorax chiefly covered with white hairs, but also with a few short spindle-shaped creamy scales. Dark longitudinal lines and two dark eye-like spots can be made out on the dorsum of the thorax.

Halteres with the knobs covered with creamy white scales.

Abdomen black, thickly covered with golden hairs but without scales.

Wing veins covered with rather broad scales (fig. 28), forming numerous black and white spots arranged as follows (fig. 29):

The costa shows four large black-scaled areas and three small ones; the first longitudinal vein shows seven dark-scaled areas of different sizes arranged as shown in the diagram; the main stem of the second longitudinal vein has two black-scaled areas, the anterior branch has five very small spots and the posterior four; the third longitudinal vein has two large black areas; the fourth longitudinal vein has three dark spots on its main stem and generally three on each of its branches; the fifth longitudinal vein has three dark spots on its main stem and one at its bifurcation, its anterior branch has five dark areas and its posterior three; the sixth longitudinal vein has four dark areas.

The number of dark and light scaled areas on some of the veins is not con-

stant, however, and two or three of the small spots may sometimes be joined together so as to form one long dark scaled area.

The wing fringe is interrupted by a light scaled area at the termination of each of the longitudinal veins.

The legs are speckled with white scales on a brown ground; in the fore legs the fifth tarsal segment has a few white scales at its tip and there are apical white scales which extend over the joint so as to form a



Fig. 28.

Wing scales and cross-veins of wing of *M. elegans*.

band to each of the other tarsal segments. The first tarsal segment is speckled with white scales in addition to the apical banding and the tibia and femur are also speckled. The markings of the mid legs are the same as those of the fore legs. In the hind legs the femora and tibiae are

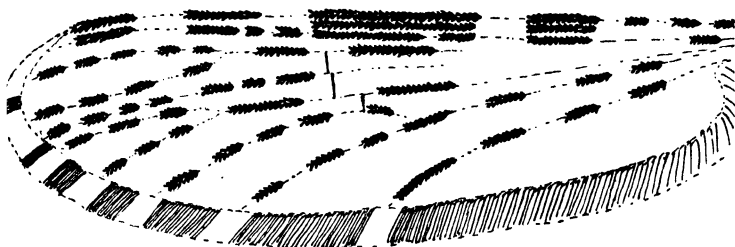


Fig. 29.

Wing of *Myzomyia elegans*. (Drawn by Capt. James.)

speckled with white scales. At the lower end of the tibia and upper end of the first tarsal segment (metatarsus) there are broad white bands, the two together forming a very broad and characteristic band at this joint;



Fig. 30.

Wing of *Anopheles leucophyrus*. (♀.) Dönitz. (After Dönitz.)

at the other tarsal joints also there are white bands, and the tip of the fifth tarsal segment has a few white scales. None of the tarsal segments are wholly white.

♂. Unknown.

Larva.—Unknown.

Habitat.—Collected by Dr. Coghill in Karwar (Bombay Presidency).

Time of capture.—April.

Observations.—Very near to *Stephensi*, but differs in having four white palpal bands, in having four instead of three spots on the sixth long vein and in the other differences on the much spotted wings. It is especially characterised by the large white tibio-metatarsal band on the hind legs, very similar to Dönitz's *leucophyrus*, but can easily be told by its having four not six spots on the sixth long vein and by the apical palpal band being

narrower than in *leucophyrus*. The spots on the costal border are also not so numerous. The species is evidently variable and thus may only be a variety of *leucophyrus*. The type is in the British Museum (Nat. Hist.), presented by the describer. I am not sure if it comes in this genus, as the specimen is imperfect. It may be a *Nyssorhynchus*.

ANOPHELES (MYZOMYIA ?) IMPUNCTUS. Dönitz.

(Beit. z. Kennt. d. Anop., 1902, p. 67.)

This is described from a balsam specimen, and the description is thus too incomplete to be of any diagnostic value. Really only the wing is described, and in balsam specimens scales, etc., get destroyed and may even have been damaged previously. Any way, wings are variable, and it is just as unscientific to describe an insect from its wing as its leg or head alone. It is probably one of the species I have described from North Africa, so kindly sent me by French collectors. In the commencement of the description the author says "the two forks begin at an equal height" (unless my translation is wrong); but in the photo (Fig. 15, Taf. II.) the base of the first sub-marginal cell is decidedly nearer the apex of the wing than that of the second posterior.

The description is as follows:—

The two forks begin at an equal height. There are four small dark spots at the anterior margin of the wings; the marginal spots are missing on the branches of the superior fork and on the superior branch of the inferior fork. Three small spots on the sixth long vein. All the spots small and scanty. Joints of palpi with narrow light scaling.

Description of a specimen in Canada balsam. The four spots on the

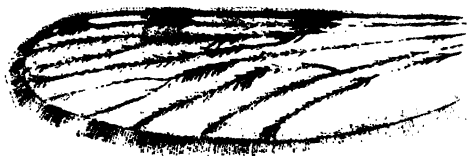


Fig. 31.

Wing of *Anopheles impunctus*. ♀. (After Dönitz.)

anterior margin are small, of almost equal length, and extend evenly on to the first longitudinal vein; even the membrane itself is darkened at these places. Spot two reaches to the second long vein, on which there is

still another spot just beneath the light incision between the second and third anterior marginal spot; beneath this there is again a spot on the third vein and on the fourth vein; the latter close in front of the fork. There are besides only a few dark scales on vein three in front of the central transverse vein. The upper branch of the large fork carries two little spots on its basal half; the root-spot of the fifth vein is, compared with the first of the three spots on the sixth vein, somewhat compressed (? basal). The marginal spots present are small and punctiform, those on the lower branch of the lower fork disappearing, and the three mentioned in the diagnosis are absent. The wing fringe spotted, the entire tip of the wing to beneath vein three with light fringe, and only bisected by a narrow dark tuft beneath the superior branch of the superior fork. The median transverse is at a distance double its length from the superior transverse vein, the inferior a little way back. The legs exhibit no peculiarities in the balsam preparation; the femora on the lateral aspect do not seem to be thickened at the base, but the tibia appear to be thickened above the tarsal joint. Thorax and abdomen, 4.1 mm.

Head and proboscis.—2.3 mm.

Habitat.—Lower Egypt (Wadi Natrûn).

Note.—I have had the figure of the wing reproduced as well as possible from the figure given.—F. V. T.

MYZOMYIA TESSELLATUM. Theobald.

(Mono. Culicid. I., p. 175.)

This is, as Dönitz says, distinct from his *M. punctulatus*.

GENUS 3.—CYCLOLEPPTERON. Theobald.*

(Mono. Culicid. II., p. 312, Theobald.)

(Plate VII.)

Palpi long in both sexes; in the ♂ the last two joints are swollen, in the ♀ subulate. The head clothed with broad upright forked scales; thorax with very narrow-curved scales, almost hairs; abdomen with hairs, very similar to those on the thorax. Wings with similar venation to *Anopheles*, but the scales are peculiarly modified; in addition to lanceolate ones, there are numerous large inflated scales, with their free ends with circular outline, sometimes collected in patches, at others irregularly disposed.

* Blanchard has altered the spelling of this to *Cyclolepidopteron*.

CYCLOLEPPTERON GRABHAMII. Theobald.

(Mono. Culicid. I., p. 205, and II., p. 312, 1901.)

(Plate VIII.)

♀. Head black, with upright forked scales in the middle, black at the sides; clypeus black with grey sheen; antennae black, basal joint deep brown, second joint long and with dense black scales; palpi densely black scaled, unbanded; proboscis black.

Thorax slaty-grey, with deep brown mottlings and two parallel brown lines in front; two of the brown marks form more or less distinct eye-like spots. The whole mesonotum with hair-like curved golden scales and a creamy tuft in front; pleurae deep brown; scutellum pale ochraceous brown, deep brown in the middle; metanotum deep brown.

Abdomen steely-black with golden-curved hairs, especially in the middle of the segments and on the posterior borders, the hairs brown at the sides.

Legs brown, the femora and tibiae mottled with creamy scales; metatarsi and first two tarsi with narrow basal pale bands; unguis small, equal and simple.

Wings with mostly dark grey and black scales, but with numerous creamy ones on the third lower branch of the first fork-cell, a few on each branch of the second fork-cell, numerous pale scales on the fifth and its branches; the sixth with creamy scales except a black spot at the base and apex; the large, black, inflated scales form prominent black spots on the wing



Fig. 32.

Wing of *Cycloleppteron Grabhamii*. (♀.) Theobald.

field; costal border black scaled, except a yellow spot at the junction of the sub-costal and costal; first sub-marginal cell considerably longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the latter, its stem about two-thirds the length of the cell, stem of the second posterior one and a half times the length of the cell; mid-cross vein about half its length nearer the base than the super

numerary cross-vein; posterior cross-vein not quite its own length nearer the base than the mid-cross vein.

Length.—5 mm.

♂. Head black, with a median anterior patch of white upright forked scales; antennae with deep shiny brown plume hairs; palpi bronzy brown, with some golden yellow apical scales, two apical joints rather swollen, especially the penultimate; hair-tufts brown, with flaxen reflections; proboscis bronzy brown, long and thin. Thorax as in the ♀. Abdomen brown, with golden hairs. Wings with a pale spot at the junction of the sub-costal and costal and another at the apex of the wing, the space between the two pale spots thickly scaled with brown scales, the apical pale spot extends on to the first long vein and the upper branch of the first sub-marginal cell, the base of the cell has a small spot of large dark scales, the lower branch is dark at the apex, but the rest pale scaled; the third long vein has also small pale scales; the second posterior cell has a spot of large dark scales at its base and a few at the apex of each branch; the large inflated scales are dotted over the remaining veins and form a spot at the cross-veins, and a large one towards the costa, one at the base of the sixth and another at the junction of the upper and lower branches of the fifth. Halteres fuscous. Fore ungues very unequal, the large one uniserrated; mid ungues large, nearly equal, and simple.

Dates of capture.—March, April and May (Jamaica).

Notes.—Numerous fresh specimens taken by Dr. Grabham at St. Andrews and Red Hills, Kingston.

Life-history and habits.—Dr. Grabham gives me the following account of the life-history of this species:—

"I succeeded in bringing home alive in a collecting tube a



Fig. 33.

Egg case of *Cyclolepteron Grabhamii*. (Drawn by Dr. Grabham.)

specimen which had had a full meal of blood. This was introduced into a breeding bottle, and on the 2nd of April laid about

fifty eggs, arranged side by side or in radiating groups of three or more together, at the edge of the water. The ova appeared to resemble in every respect the *Anopheles* ova described and figured in the Report of the Malaria Expedition to Nigeria, Pt. I.—the 'floats,' 'sole-shaped' area on the upper surface, spiral rupture of egg-case, etc. The hexagonal markings on the under surface become plainly visible after prolonged maceration in strong potash solution. On the 4th of April the larvae hatched out; a good many perished in the early stages. In floating and habits generally they seem to resemble *Anopheles*

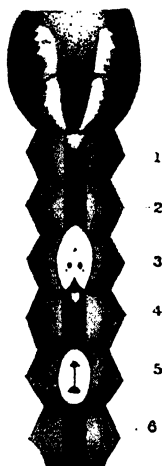


Fig. 34.

Cyclolepteron Grabhamii.
Theobald.

Thoracic and abdominal
ornamentation of larva
(Dr. Grabham).

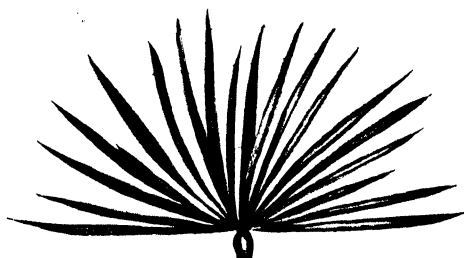


Fig. 35.

Palmate hair of larva (*C. Grabhamii*).
(Original.)

larvae precisely. The colour of the adult larvae varied greatly, dull olive green and bluish-gray shades prevailed. The commonest type of ornamentation is as in the diagram (fig. 34). A roughly V-shaped mark on the thorax with its apex completed on the first abdominal segment. A snowy-white shield-shaped mark with five dark spots on it on the second and third segments, a small triangular mark on the fourth segment, and on the fifth segment an oval mark with an irregular dark area in the centre. The brightest of all these marks was that on the third segment."

In another letter Dr. Grabham refers to the larvae as having "a continuous brilliant white band along the median dorsal line extending from the respiratory stigmata forward on to the thorax; this character renders them most conspicuous when examined by reflected light on the surface of the water." In another letter he states this white line ends in a fork-shaped mark on the thorax. But in his last letter he says that "the continuous silvery streak on the upper surface, which I formerly

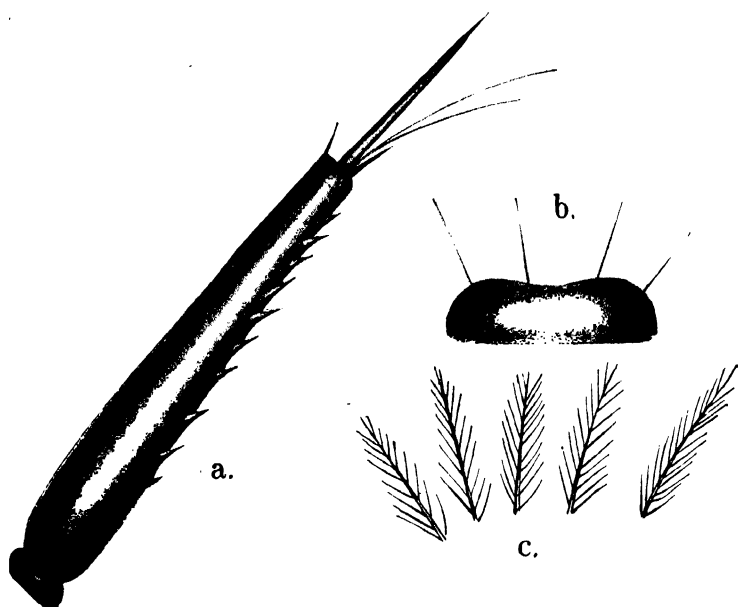


Fig. 36.

Cyclolepperon Grabhamii. Theobald.

a, Antenna of larva; b, frontal hairs; c, frontal thoracic hairs.

thought was a constant feature, was only observed in two of the fourteen specimens."

The larvae have six pairs of palmate hairs, each with twenty lanceolate lamellae, four smaller than the others (fig. 35).

The frontal hairs are simple (fig. 36, b), and on the front of the thorax are five plumose hairs (c). The antennae (a) have a series of teeth along one side and terminate in one large and two small spines and two bristles.

CYCLOLEPPTERON MEDIOPUNCTATUS. n. sp. (Lutz MS.).

(Plate VII.)

Thorax reddish-brown, with a grey sheen, with two black eye-like spots and a large dark spot in front of and extending on to the scutellum, the mesothorax spotted with deep reddish-brown and with pale scales. Abdomen deep brown, with golden hairs and lateral scale tufts. Palpi banded with black and gold. Legs deep brown, spotted and banded with golden yellow, the last tarsal segment of all the legs yellow. Wings with black and white scales, the black forming three prominent costal spots on tinged ground, several small white costal spots.

♂. Head deep brown, with very short creamy upright forked scales in the middle, the edge of the eyes grey towards the middle of the head, brown laterally, two large tufts of long golden hairs projecting forwards. Antennae banded with pale brown and grey, with flaxen brown plumes; palpi with the two apical joints swollen, golden yellow with narrow basal black bands, the rest of the palpi black, with patches of golden scales, especially towards the base, where the scales become dense, hair tufts golden and flaxen, with shades of brown; proboscis brown, thin curved downwards.

Thorax pale reddish-brown, with a greyish sheen, rather large deep reddish-brown spots in the middle and a broad line of smaller ones on each side, about the middle of the mesonotum on each side a prominent black eye-like spot and another larger one at the back of the mesonotum extending over the middle of the scutellum, thorax clothed with scattered golden hair-like curved scales and a few rather flat white ones over the roots of the wings; metanotum pale brown; pleurae brown, with two grey curious twisted marks.

Abdomen deep blackish-brown, with golden hairs, each segment with apical lateral tufts of black and golden scales and ventral scales, especially on the apical segments.

Legs deep brown, spotted and banded with rich golden yellow, the spotting most pronounced on the femora and tibiae, the banding on the metatarsi and tarsi, on the former irregular, on the latter broad and more pronounced, but also showing spotting on the dark areas; last tarsal segment of all the legs yellow.

Wings with black and white scales and with the membrane with three brown patches on the costal border. The black scales

form three prominent large costal spots over the tinged areas; the remaining dark costal border is broken by about ten small white spots, of which there are several also on the first long vein. The first fork-cell has its branches thickly clothed with pale small brown and grey scales in patches and with a few black *Cycloleppteron* scales at its base, so also has the greater part of the third vein and the branches of the second fork-cell, the stems of the fork-cells and basal portions of the other veins with

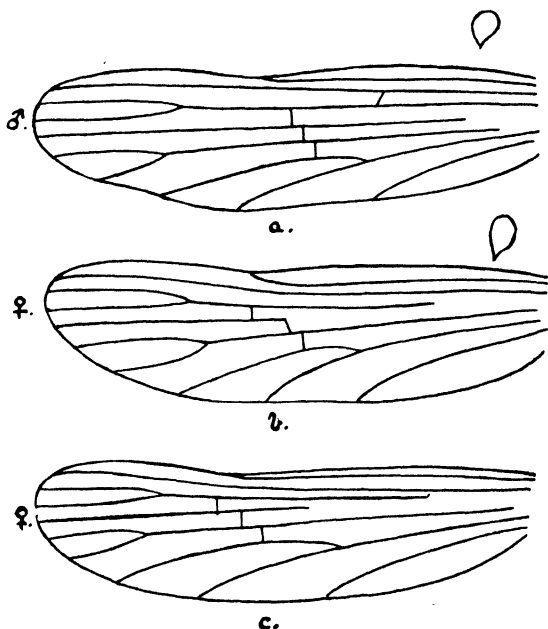


Fig. 37.

a and b, wing of ♂ and ♀ *Cycloleppteron mediopunctatus*. n. sp.
c, ♀ *A. maculipes*. n. sp.

scattered black inflated scales; the sixth has grey scales, especially along its basal half, and three small spots of inflated black ones; fringe pale, apparently unspotted; halteres large, fuscous.

Length.—5 mm.

Habitat.—Brazil (Dr. Lutz).

Observations.—Described from a perfect ♂. It is the most beautiful *Anophelete* I have seen. Together with this ♂, Dr. Lutz sent me a preparation of the ♀ wing. This shows

typical *Cycloleppter* scales. Later he sent me several ♀'s, which he came to the conclusion were the ♀'s of the male here described, and mentions that the ♀ wing sent was that of a male *C. mediopunctatus*. These ♀'s presented no *Cycloleppter* characters, and moreover are black and silvery grey, not the brilliant golden hue seen in the male *Cycloleppter*. The ♀ of *C. Grabhamii* has true *Cycloleppter* scales, but the ♀'s sent by Lutz have none whatever; in fact, I feel certain that they are not the ♀'s of this species, but quite distinct, although they have assumed the general appearance of the *Cycloleppter*. Moreover, the wing sent me as that of a ♀ certainly differs from the ♂'s I have examined, and I venture to think Dr. Lutz was correct in his first surmise, the difference being noticeable in the relative positions of the fork-cells and, to some extent, the cross-veins, which, however, may be variable. (*Vide* fig. 37.)

GENUS 4. **STETHOMYIA.** Theobald.

(*Jour. Trop. Med.* V., p. 181, 1902.)

(Plate VII.)

Allied to *Anopheles*. Head with a patch of *flat scales* in front on the middle line, and covered with numerous bristles and very thin upright forked scales almost like bristles; palpi in the ♀ long and thin, four-jointed, the terminal joint slightly swollen near the apex. Thorax bristly, but apparently nude; prothoracic lobes bristly and mammillated. Abdomen very pilose, hairs of two sizes, the smaller ones in rows. Wings unspotted, the veins clothed with long lancet-shaped scales (Plate VII.). Legs long and thin, with simple, equal unguis in the ♀. Palpi of the male much swollen; claspers of the genitalia long; unguis of fore-legs very unequal, the longer unserrated; the mid and hind small, equal, and simple.

This genus differs from *Anopheles* in having some flat scales on the head and in the peculiar mammillated structure of the prothoracic lobes. A single species only is known, occurring in British Guiana and Para.

STETHOMYIA NIMBA. n. sp.

Black, with a silvery line down the middle of the mesonotum and a silvery line around the sides of the mesonotum. Legs

long and thin, black, unbanded. Wings unspotted, rather densely scaled, with brown scales.

♀. Head black, with a small median anterior patch of flat white scales projecting forwards, sides of the head with a grey sheen, and also a narrow grey line around the eyes; numerous black bristles and very narrow black upright forked scales behind and on the occiput; traces of a few small brown flat scales in the middle line; clypeus black. Proboscis black, covered with small black and bronzy scales and with small black bristles; palpi a little longer than the proboscis, very thin, like those of *A. bifurcatus*, deep brown, four-jointed, basal joint rather swollen, apical joint about the same length as the second joint, slightly swollen, and a little more than half the length of

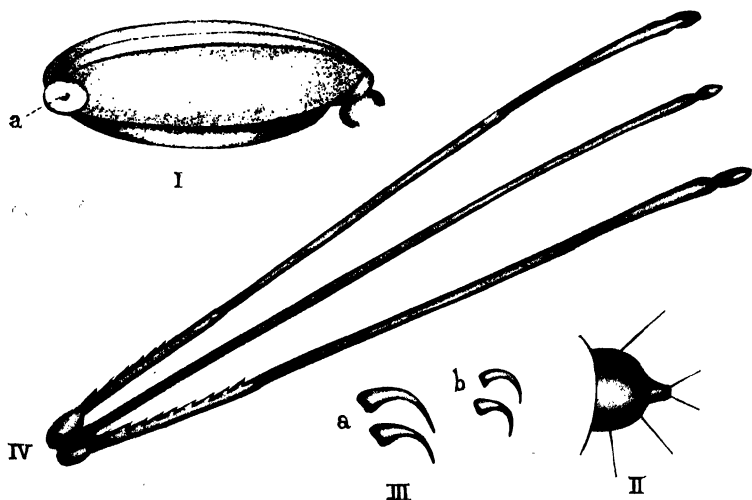


Fig. 88.

Stethomyia nimba. n. sp.

I, Thorax (a, mammillated prothoracic lobe); II, prothoracic lobe; III, (a) fore and (b) hind unguës of ♀; IV, ♀ palpi and proboscis (greatly enlarged).

the penultimate joint; scales deep brown; at the junction of the joints, the palpi are rather paler; a few black bristles at the apex, which is sometimes apparently constricted; antennae brown, basal joint black, verticillate hairs black. Mesonotum black, nude, with a silvery-grey median line and a silvery-grey band on each side, and numerous black bristles; prothoracic lobes black, with a dull-grey sheen and a mammilliform process,

with a few black bristles (fig. 38, II) ; scutellum black, with deep brown border-bristles ; metanotum black ; pleurae brown.

Abdomen black with deep brown tessellated marks in certain lights, covered with rows of small, dull, pale hairs and longer brown lateral ones. Legs deep brown, rather paler at the base, long and thin : unguis rather thick, small, equal and simple.

Wings unspotted, with the veins covered with deep brown scales ; the first sub-marginal cell longer and little narrower than the second posterior cell, its base much nearer the base of the wing than that of the second posterior, its stem about one-fourth the length of the cell ; stem of the second posterior as long as the cell ; supernumerary and posterior cross-veins in one line, mid cross-vein slightly in front of both ; the sub-costal joins the costal nearer the apex of the wing than any of the cross-veins.

Halteres with pallid stem and fuscous knob.

Length.—4·5 mm.

♂. Palpi black, unbanded, the two apical joints swollen, the apical very short, the second or penultimate much constricted at the base, both minutely hairy and densely scaled. Antennae with deep brown plume-hairs ; proboscis black. Thorax ornamented as in the female. Legs long and thin ; fore unguis unequal, the larger uniserrated ; mid and hind equal and simple. Genitalia with long claspers.

Length.—4·5 mm.

Habitat.—British Guiana (Dr. Low) ♀ and ♂, and Para (Dr. Durham), ♂.

Observations.—Described from specimens sent by Dr. Low per Dr. Manson. It is a very distinct species, but in one the peculiar thoracic ornamentation is not shown, the mesonotum being apparently damaged. The long thin legs are very characteristic. It bears a resemblance to our *A. nigripes*, but the thoracic ornamentation differs. Dr. Low considers this very distinct *Anophelete* to be the intermediate host of the malarial parasites in British Guiana. He writes as follows to Dr. Manson : " Malarial fever is got amongst the Indians and often of a severe type. In that connection it is interesting that in the interior at a place called Corato I got an entirely new *Anopheles* in large numbers."

Dr. Low writes that he got samples of this new genus at Cabacaburi, Pomeroon River. It was very common, forming the greatest number of mosquitoes caught at night and brought

down every morning to him by the native boys at Pickersgill, further down the river. In the position it took up when resting it resembles a *Culex*, though its palps were as long as the proboscis. The legs are very long and fine and easily break off. Dr. Low never observed it by day, so it is evidently



Fig. 39.

Stethomyia nimba. n. sp.
Fore and mid unguis of ♂.

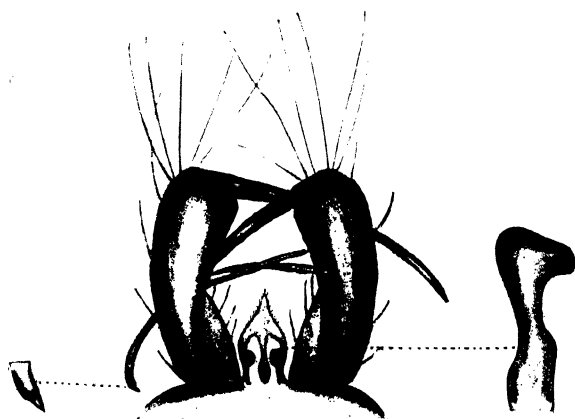


Fig. 40.

Stethomyia nimba. n. sp.
♂ genitalia



Fig. 41.

♂ palp of
Stethomyia nimba.

nocturnal in its habits and must feed greedily, for in the morning its stomach is full of blood. The females predominated largely and soon died in captivity. Thirty specimens were dissected by Dr. Low to see if they took any part in the spread of *Filaria demacquaii*, but he obtained negative results (*vide* Brit. Med. Journal, 25.1.02).

GENUS 5. **PYRETOPHORUS.** Blanchard.

HOWARDIA. Theobald.

(Compt. Rend. Hebdom. Soc. de Biol. No. 23, p. 795, Blanchard; Journ. Trop. Med. V., p. 181 (1902), Theobald.

(Plate V.)

Thorax with narrow-curved scales, often rather elongated; abdomen with hair-like curved scales, practically hairs (fig. 1, 5), the ♀ lamellae only with scales; wings with small, short, lanceolate or narrowish scales (Plate V.), much spotted as a rule; palpi of the ♀ moderately scaled; legs banded, sometimes spotted. No flat scales on the head.

The larvae frequent puddles and streams; those of *Jeyporensis* have branched frontal and median hairs.

The genus was renamed *Pyretophorus* by Blanchard, as *Howardia* had been previously employed by Dalla Torre in 1897.

It can at once be told from *Myzomyia* by the thoracic scales being narrow-curved scales, not hair-like. They are sometimes quite large.

PYRETOPHORUS JEYPORENSIS. n. sp.

(Plate VIII.)

Thorax ashy-grey in the middle, with narrow-curved pale scales, dark brown at the sides. Abdomen brown, with golden-brown hairs. Palpi black, with three white bands, the widest apical. Wings normally, with three pale costal spots, two towards the apex, and a small one near the base, a fourth may be present; fringe spotted. Legs deep brown, with very narrow apical pale bands.

♀. Head grey in the middle, deep brown at the sides, covered in the centre with creamy-white upright forked scales, and at the sides with black upright forked scales, with a tuft of long white scales projecting forwards over the proboscis; antennae brown, the basal joint dark brown, the second and third joints with grey scales, pubescence pale; palpi (fig. 16, 5) covered with deep brown scales, the apex with a broad white band, and a narrow white band on the apex of the penultimate and antepenultimate joints; proboscis deep brown, the apex pale.

Thorax ashy-grey in the centre, deep brown at the sides, covered with narrow-curved creamy-white scales and dull golden hairs, showing darker lines on the median grey area when denuded, a tuft of long grey scales in front over the head; scutellum brown with greyish sheen, with a few rather elongated narrow-curved white scales and brown border-bristles; metanotum deep brown; pleurae rich brown.

Abdomen deep brown, with golden-brown hairs.

Legs deep blackish-brown, with narrow apical pale bands visible in certain lights only ; ungues small, equal, and simple.

Wings with long thin lanceolate lateral vein scales ; the costa black, with two large white spots on the apical half and two small ones at the base ; between the second large one and the first small basal one are a few white scales which do not pass normally on to the costal border (in some specimens they do, however, and so another small costal spot is formed) (fig. 16, 5), the pale costal areas pass on to the first long vein ; the first costal spot also passes on to the upper branch of the first fork-cell, which has a pale spot at its base and also two pale spots on its stem ; there is a pale area towards the apex and a small one at the base of the third long vein (sometimes the greater part of the third long vein becomes pale-scaled) ; a small pale spot at the cross-veins on the fourth vein and another at its base ; a large pale area on the upper branch of the fifth, and another near the base, and one on its lower branch, and three on the sixth vein ; apical fringe yellow, with two black spots, remainder dark, with a pale spot, where each vein joins the costa ; border-scales yellow. Halteres with deep ochraceous stem and fuscous knob.

Length.—4 mm.

♂. Palpi deep brown, the two apical joints swollen, short, the apical one white, the penultimate with a large white patch on one side, apex of the antepenultimate white, a few pale and brown hairs on the last two joints, and a small tuft at the apex of the antepenultimate ; antennae banded grey and brown, the brown forming narrow bands ; plume-hairs brown.

Ungues of the fore legs unequal, the larger uniserrated, those of the middle and fore legs small, equal, and simple. Basal lobes of the ♂ genitalia scaly ; claspers long.

Length.—4 to 4.5 mm.

Habitat.—Jeypore Agency, India (Stephens and Christophers).

Observations.—Described from three ♀'s and two ♂'s sent over by Dr. Christophers. It resembles at first sight *Myzomyia culicifacies*, Giles, but can at once be told by the narrow curved



Fig. 42

Pyretophorus Jeyporensis. n. sp.
♂ palp.

mesothoracic scales, which in *culicifacies* are hair-like. The larvae also differ, as do the eggs. The frontal hairs of the larva (fig. 18, 1) are plumose, and the palmate hairs (fig. 18, 4) are large, and are jagged at the side.

The ovum (fig. 18, 6) resembles that of *N. Jamesii* and *N. Theobaldi*.

The larvae chiefly frequent paddy fields, but are also found in streams.

There is some variation in the wing-markings, an additional costal spot being found in some specimens.

Pyretophorus Chaudoyei. n. sp.

(Plates VI. and IX.)

Thorax pale brown, with two dark median parallel lines and numerous narrow-curved golden scales. Head black, with dense

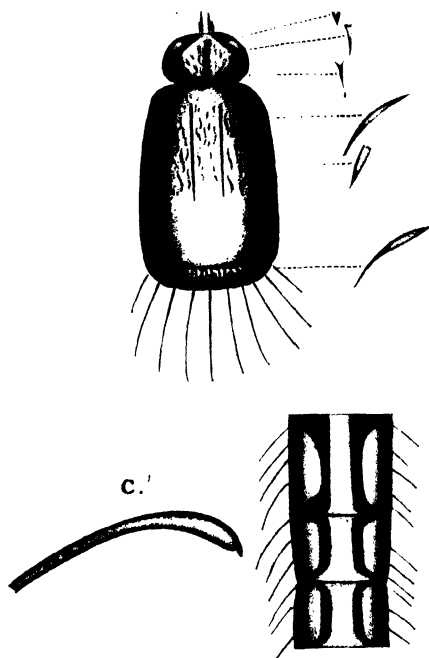


Fig. 43.

Pyretophorus Chaudoyei. n. sp.

a, Head and thorax ; b, abdomen of ♂ ; c, ♂ clasper.

white upright scales in front ; palpi with the apex black and with three narrow white bands. Wings with mostly creamy-yellow

scales and a few small black patches and six black costal spots, smaller than the intervening yellow areas. Abdomen deep brown. Legs deep brown, unbanded, a pale knee and tibial spot to the hind legs.

♀. Head black (Plate IX.), with black upright forked scales behind, creamy-white ones in front and some median narrow flat ones on each side of the bare median line in front, and a few long pointed ones forming a frontal tuft; antennae deep brown, the first few basal joints with narrow white scales, basal joint testaceous; palpi (fig. 16, 7) deep brown, with three narrow white bands, *apex black*, the first two apical bands nearer one another than the second and third bands; clypeus fawn coloured; proboscis deep brown.

Thorax bright brown, paler in some specimens than others, showing two more or less distinct dark median lines, with numerous pale golden, long, narrow-curved scales, which are more flattened laterally; scutellum pale brown, with pale long, narrow-curved scales, and long brown border-bristles; metanotum mottled with chestnut-brown and dark brown; pleurae chestnut-brown.

Abdomen deep brown, almost black, with golden curved hairs.

Wings with the veins mostly pale yellow scaled, with a few black patches; costa with five or six black spots, all much smaller than the intervening yellow areas, the apical one small, the next larger as a rule, but in some specimens very small, the third largest, the fourth the same size as the second, the basal one very small, base of wing pale, the first four spread evenly on to the



Fig. 44.

Wing of *Pyretophorus Chaudoyei*. ♀. n. sp.

first long vein, the third and fourth across the sub-costal; there is a small black spot on the upper branch of the first fork-cell, just under the first costal spot, a small apical one and another trace on the lower branch, the stem with two black spots, a large one under the third costal spot; the third long vein has one at its apex and another near its base; the fourth has two small ones on its upper, one on its lower branch, and two larger ones on its

stem; the fifth has three on its upper branch and one large one towards the base on its stem and one at the apex of its lower branch; the sixth has three black spots; fringe with pale spots at the end of each vein, except the sixth, that at the end of the lower branch of the fifth large; first sub-marginal cell longer and narrower than the second posterior cell, its stem nearly two-thirds the length of the cell; stem of the second posterior as long as the cell; bases of the fork-cells nearly level; supernumerary and mid cross-veins nearly in a straight line, the posterior cross-vein nearly three times its own length distant from the mid; halteres testaceous.

Legs deep brown; coxae pale; traces of narrow pale apical bands on the fore and mid femora and tibiae, more pronounced in the hind legs.

Length.—4·5 mm.

♂. Palpi pale brown, the two apical joints swollen, with a few pale hairs; the apical joint dark, a pale band at the apex of the next three joints; antennae with bright fawn hairs. Abdomen pallid, with darker markings in the form of lateral crescentic figures, especially seen in the basal segments; claspers much as in *funesta*. (Fig. 43, b and c.)

Length.—4·5 to 5 mm.

Habitat.—Touggourt, Algeria (Dr. Chaudoye), per Dr. Billet.

Observations.—Described from a series of ♀'s sent by Dr. Billet. It was first taken by Dr. Billet to be *superpictus*, but Leveran informed him it was not Grassi's species. It is a very abundant species at Touggourt and the only one found in that locality. The discoverer points out that it is very interesting,



Fig. 45.

Pyretophorus Chaudoyei. n. sp.

(To show variation in wing spots.)

that in winter until up to June one only sees *Culex pipiens* at this place, and these disappear from June and give place to this *Anopheles*. At the same time as this *Anopheles* appears, there also appears the malaria, usually in a grave form, and from which the natives themselves suffer. Sporozootes have been

noted in this species at Touggourt, an advanced southern post in the Sahara. The species is subject to some variation in costal markings, the second black spot from the apex in some specimens is very small, often being merely a black speck. (Fig. 45.).

PYRETOPHORUS PALESTINENSIS. n. sp.

(Plate VI.)

Thorax pale greyish-fawn, brown at the sides, with a median brown line, two paler short lateral lines in front, traces of others behind, covered scantily with flat narrow-curved creamy scales, especially at the junction of the light and dark areas. Legs brown; tarsi unbanded, a pale spot at the junction of tibiae and femora, and tibiae and metatarsi. Abdomen brown. Wings

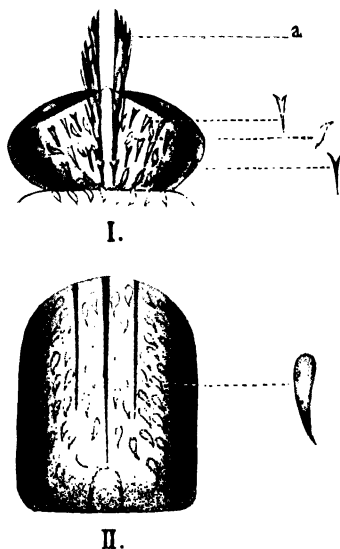


Fig. 46.

Head (I) and thorax (II) of *P. Palestinensis*;
a, frontal process.

with five large black costal spots, and five yellowish ones of unequal length, the middle black one the most prominent. Palpi brown, with three pale bands, the apex white. Fore ♂ unguis with the larger one uniserrated.

♀. Head brown, with upright white forked scales and large narrow curved scales of the same colour, with two very prominent

long projecting median tufts (Fig. 46, I. a); antennae brown, basal joint fawn coloured, next three or four joints with small grey scales; palpi brown, with pale bands at the junction of the second and third and third and fourth joints, apex with a broad pale band, the apical and middle pale bands are nearer together than the middle and basal ones. Proboscis brown.

Thorax fawn coloured in the middle, with deep brown sides, the pale median area having a deep brown median line, traces of a parallel line on each side of it in front and others behind; the surface, especially at the junction of the pale and dark areas, covered with narrow-curved flat creamy-grey scales; a dense mass of them project over the head; scutellum pallid, with narrow-curved scales; metanotum deeper brown; pleurae pale chestnut-brown, fading into grey.

Abdomen brown, mottled with deeper brown, with a few scattered pale golden hairs.

Legs brown; coxae grey, femora and tibiae with a pale band at their junction, also at the tibial and metatarsal joint; tarsi unbanded; unguis small, equal and simple.

Wings with narrow small lanceolate lateral scales; the costa with five black unequal spots, one basal, separated by creamy areas, the middle black spot much the largest, the two apical ones of nearly equal length, the fourth black costal spot is long,



Fig. 47.

P. Pulestinensis. (♀.) n. sp.

(Two variations in wing markings.)

and is nearly broken in two by a few white scales on its lower portion, but these do not reach the top of the vein; the two apical black spots are carried evenly on to the first long vein, the third evenly on to the sub-costal, but only as a smaller median

patch and a small apical one on the first long vein ; the sub-costal and first long vein have a black patch under the apex of the fourth black spot ; the first sub-marginal cell has a black spot on each of its branches, the lower one having a small additional apical spot ; the second long vein has also two, the largest under the third costal spot ; the third long vein yellowish, with a black spot near the apex and one towards its base, between the second and third black costal spots ; fourth long vein with two black spots on each of its branches, and two long ones on the stem ; fifth with two on its upper, one on its lower branch, and one prominent one at the base ; sixth long vein with its apical half black, and with a small black spot on the basal yellow portion ; first sub-marginal cell very slightly longer and narrower than the second posterior, its base a little nearer the apex of the wing than that of the latter, its stem nearly as long as the cell ; stem of the second posterior as long as the cell ; mid cross-vein about its own length behind the supernumerary, posterior cross-vein rather more than its own length behind the mid. Halteres with long thin pale stem and deep fuscous knob.

Length.—4·5 mm.

♂. In the male the fore ungues are very unequal, the larger uniserrated ; the hind and mid equal and simple. Claspers long and curved, with a terminal tooth.



Fig. 48.

P. Palestinensis. n. sp.

♂ genitalia.

Length.—4·5 mm.

Time of capture.—June.

Habitat.—Palestine (Dr. Cropper) ; Cyprus (Miss D. M. A. Bate).

Observations.—Very close to Grassi's *A. superpictus*, but differs in the unbanded legs, spotted wing fringe and uniserrated large fore unguis in the ♂, also like *Hispaniola*, but can at once be told by the narrow flat scales on the thorax, of quite a different structure to the narrow hair-like ones in *Hispaniola* and *Turkhuhi*, and clearly relegating it to the genus *Pyretophorus*. On the other hand, it is closely related to *P. Chaudoyei*, but differs from it in the form of the large costal spot, in the apical half of the sixth long vein being dark, and in the presence of a deep brown median thoracic line.

Dr. Cropper found the larvae of this species in abundance at Beyrouth, in a runnel of water containing *Spirogyra*, near the Beyrouth River, though the latter was free from larvae. At Sidon they occurred and were found in a narrow valley at Ain ed Dilb in the chalk. The imagines were caught on rocks at the edge of the stream at sunset. Six weeks later, Dr. Cropper found them still more abundant, together with *Culex mimeticus*. They were also found in semi-stagnant pools in the rocky riverbed at Banias, and the imagines in tents. Miss Bate informs me this species is found everywhere in the plains in Cyprus and up to 4,000 feet at Phini.

PYRETOPHORUS COSTALIS. Loew.

Anopheles costalis. Loew.

Anopheles Gambiae. Giles.

Anopheles gracilis. Dönitz (?).

(Mono. Culicid. I. 1901, p. 157; Beit. z. Kennt. d. Anoph. p. 76, 1902 (*gracilis*), Dönitz; Handbk. Gnats, 2nd ed. 1902, p. 511 (*Gambiae*), Giles.)

(Plate V.)

Additional localities.—Gambia (Burdett and Dutton); Lagos (Strachan); Mauritius (Daruty and D'Emmerez); Nigeria (Hanley, 1.8.99); Togo and Cameroon (Dr. Ziemann), recorded by Dönitz as a new species—*gracilis*; Uganda, at Entebbe, Maniumba, etc. (Moffat, Low, Christy).

Times of capture.—June, July and August, in bedroom, McCarthy's Island, Gambia; October, November and December at Lagos.

Synonymy—Without the least hesitation, I feel sure the species described by Dönitz is only *costalis*. This species is very marked, and can at once be told; how Dönitz overlooked it I

cannot understand. The wings have the spots on the wing field variable to some extent and also the costal spots, but the latter are most constant and peculiar and only occur in one other species (*Marshallii*). The only difference I see in the specimens described by Dönitz is that the first tarsal is spotted. I have only in one or two instances seen traces of pale scales on the tarsi in *costalis*. Dönitz appears to think the *costalis* figured by Giles in the "Memoirs" of the Liverpool School and those described by me are not Loew's species. He does not exactly say what his idea of Loew's *costalis* is, but appears to think my *cinereus* may be; yet at the same time he gives one point in which my *costalis* cannot be the real *costalis*: because it has faintly annulated legs. Why, then, should he say my *cinereus* comes near *costalis* and recommend it to investigators, when it also has banded legs? Mr. Austen identified *costalis* as Loew's species, and I quite concurred in his identification. It is now the recognised *costalis* of Loew all over Africa where it occurs,



Fig. 49.

Wing of *P. costalis* (♀). Loew (from Gambia.)

except possibly in the Cameroons, and I think it is likely to remain so until it is proved to be otherwise by an examination of the type, which I cannot trace. There is not the least doubt Loew described a worn specimen in which the leg banding was indistinct; in fact, I have seen fresh specimens in which it is nearly absent. As to Dönitz's suggestion of renaming the species, I should not dream of doing it. The species has been so long known as *costalis* by all the important medical men in Africa that endless confusion would ensue, and without any just cause.

The Gambian specimens bred by Dr. Dutton from larvae taken in a large pool at Bathurst showed great variation in regard to the intensity of the costal spots and leg ornamentation. One very marked melanic form has been described here as a distinct variety.

In 1902 Colonel Giles, I.M.S., described a specimen given to me by Dr. Budgett from Gambia as a distinct species. I cannot

see any real difference from *costalis*, and am obliged to sink it also as a synonym. At least it varies no more from the type than any others sent in any one series from the West Coast.

PYRETOPHORUS COSTALIS.

Variety *melas*.

Thorax dark brown to almost black, with narrow-curved pale golden scales as in the type; palpi with four pale bands, very narrow, the fourth on the apex of the palpi, very scaly at their bases; the two apical bands are close together, but quite distinct. Abdomen deep black, with pale hairs, golden at the apex. Legs prominently black, spotted and banded, fore legs with a trace of pale spots in the femora as in the type, pale spots on the tibiae and a narrow pale band-like spot on the metatarsi, a yellow band involving both sides of the joints at the metatarsus and first tarsal and at the first tarsal and second tarsal; in the mid legs the tibiae are spotted, but the tarsal banding is not distinct, nor are the tarsi banded in the hind legs, and the tibial and femoral spots are not so well defined.

Wings with black and yellow scaled areas, the former predominating; the costa is deep black, the second spot only appearing on the costa as a small almost white spot, there are also two small pale spots on the costa towards the base of the wing; on the first long vein are six pale spots, one under the white costal spot, the others arranged much as in the type, but the black areas more pronounced; the greater part of the third long vein is pale, and the second mostly dark scaled, except for the pale patch at the base of the fork and a pale patch towards the apex of its lower branch; most of the fourth dark scaled, the lower branch of the fork having two pale patches; the fifth mostly pale scaled, but with three dark patches on the upper branch, and a small one at the apex, and another at the base of the lower and on its stem; sixth with three black spots; fringe spots very indistinct. Fork-cells and cross-veins as in the type.

Length.—5 mm.

Habitat.—Gambia (Dutton).

Time of capture.—December.

Observations.—Described from a single perfect ♀. It forms a very distinct melanic variety. Its chief difference from a typical *costalis* is the absence of pale costal spots, one only

reaching the actual costa, except at the base; the whole wing field is darker and the legs with more pronounced spotting. The markings of the first long vein are, however, typical of the species.

PYRETOPHORUS MARSHALLII. n. sp.

Thorax slaty-grey in the middle, deep brown at each side, with grey scales; head black, with dull white scales; *palpi black, with a broad white apical band, another of the same width close to it and a small one towards the base of each palp.* Legs deep brown, with traces of apical pale bands to the metatarsi and tarsi. Wings with six small creamy costal spots, the two median black areas the largest; black scaled areas slightly predominating on the wings.

♀. Head black, with numerous grey upright forked scales in front, and some black ones behind; two large median grey projecting tufts, antennae deep brown, the basal joint deep testaceous, the next three or four following joints with white scales; palpi blackish, with three white bands, *the two apical ones very broad, the basal one small, apex white.* (Fig. 16, 8.)

Thorax slaty-grey in the middle, deep brown at the sides, with traces of two median darker lines, covered sparsely with narrow-curved grey scales. Abdomen black, with brown and dull golden hairs.

Legs deep brown, apices of all the joints, except the last tarsal, with minute yellow bands, most indistinct on the fore legs, most pronounced on the hind.

Wings (Fig. 16, 8) with the costa with six small creamy spots, separated by jet black areas, of which the second and third are the largest; the first spreads evenly on to the first long vein, the second is broken in the middle, but is the same length as that on the costa, the third continues on to the first long vein, but is broken at its basal end, the fourth spreads evenly on to the vein, the two small basal black spots are not continued on to the first vein; there is a black fringe spot at the apex of the wing between the two branches of the first sub-marginal cell; the second long vein is all black scaled, except for a small creamy spot on its lower branch, one at the base of the fork-cell and another small one on its stem; the third long vein is broadly white in the middle, with a black spot at each end; the fourth is also mostly black scaled, but has a yellow patch on each branch of

the fork-cell and a trace at the apex of each branch, a small pale spot at its base and two on its stems; the fifth is mostly pale scaled, the upper branch has three dark spots, the two basal ones close together, the lower branch one long apical one, base of the fork dark and also a black spot at the base of the vein; the sixth mostly black scaled, with two basal pale patches; fringe with pale spots where all the veins join; first sub-marginal cell longer and narrower than the second posterior cell, its stem more than half the length of the cell, its base nearer the base of the wing than that of the second posterior cell; stem of the latter as long as the cell; the mid cross-vein about its own length in front of the supernumerary, the posterior longer than the mid, about its own length nearer the base of the wing.

Length.—3·5 to 4 mm.

Habitat.—Salisbury, Mashonaland (G. A. K. Marshall).

Time of capture.—April.

Observations.—Described from a single ♀. It is quite different to all African species I have seen, the two broad white apical palpal bands at once separating it, as well as the wing ornamentation, the wing markings being very similar to *costalis*. It comes nearest *P. costalis* (Loew), but separated on account of the palpi.

PYRETOPHORUS CINEREUS. Theobald.

Anopheles cinereus. Theobald.

(Mono. Culicid. I. 1901, p. 161.)

(Plates I., VIII., and IX.)

Additional localities.—Cape Colony, at Mount Fletcher (Dr. Martin Ricono); Pretoria (Dr. Theiler).

Time of appearance.—December to March in Pretoria; after the 22nd of March they became exceptional, says Dr. Theiler.

Observations.—This seems to be a common South and Central African species. It is one of the commonest species at Pretoria. The Cape specimens have the legs apparently more faintly banded than those from Central Africa.

The thoracic scales are not hair-like, as stated in Vol. I., p. 161, but are long narrow-curved scales. To the description of the wing given on p. 163, Vol. I., add the following: two (not one) spots on the lower branch of the first fork-cell, and three (not two) on the upper branch of the fifth; the apex has the fringe usually completely yellow, the two small black spots mentioned are not always present. The basal joint of the antennae may be pale.

PYRETOPHORUS (?) MERUS. Dönitz.

Anopheles merus. Dönitz.

(Beit. z. Kennt. d. Anop., p. 77.)

The following is Dönitz's description :—

“*Diagnosis*.—The two upper forks spring up at fairly even heights, the lower, however, a little earlier than the upper.

Four large dark spots on the anterior margin of the wings.

On vein 6 the root spot lies under the spot of the fifth vein.

Vein 3 is light, only beset with dark spotlets at its commencement and termination.

Vein 4 is dark, only the region of the transverse vein being light.

Vein 5 is light; only has root and marginal spot; its superior branch dark to the middle with two light spots.

Vein 6 with three spots.

Palpi white at the joints, terminal joint quite white.

Tarsi with narrow white rings. Description after specimens from Dar es Salaam :—

♀. This specimen, in regard to the wing marking, has a superficial similarity to *A. pharoënsis*, is, however, somewhat smaller and is easily differentiated by the position of the root spot of the fifth vein just over the first spot of the sixth vein, as also by the absence of dark spots in front of the forking of the second and fifth vein. The anterior margin of the wings has essentially the same marking, namely, the four typical marginal spots, besides two small root spots, of which, however, the second is not so strongly developed as in that species. The light interstitial space

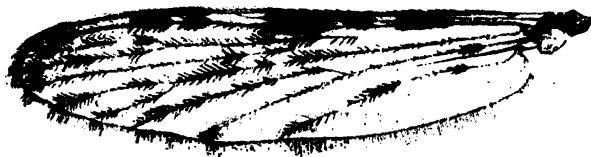


Fig. 50.

Wing of *Pyretophorus* (?) *merus*. ♀.

After Dönitz.

between the third and fourth spots is a little longer because the ascending dark spot is somewhat shorter than in *A. pharoënsis*. On the upper branch of the upper fork the first spot is much smaller, the spot in the centre of the lower fork-cell somewhat longer than the former. The third vein is light, and besides the marginal spot has only two small spots before and behind the transverse veins. The fourth vein is dark throughout its entire course, only lightened up somewhat in the region of the transverse vein; the fork-cell itself is light, and there follows on the

upper branch a longer and on the lower branch a shorter dark spot. Further on the branches are light up to the marginal points. Accordingly, veins 3 and 4 are almost exactly marked like *pharoënsis*. The fifth vein is distinguished thereby that it possesses no dark spot at the point of division and that the upper branch is darker than light. It shows, namely, a small and a longer spot up to the middle and then a long dark streak that may amalgamate with the marginal spot.

There are three spots on the sixth vein. On the ciliary margin the spots are broader than in *A. pharoënsis*, particularly remarkable on vein 6. The upper and middle central transverse veins often form a single straight line, and are at a distance of their common length from the lowest one, in other cases they are arranged step-like.

—	Index of Auxiliary Vein.	Index of the Fifth Vein.	Length of Wings.
Dar es Salaam	42·5	37·5	3·4 mm.
" "	41·7	36·2	3·1 "
" "	41·1	36·0	3·3 "
South-West Africa	41·6	37·6	3·8 "
Average	41·5	36·8	3·4 mm.

The palpi have white joints and an entirely white terminal joint, which, however, may also have a dark ring in the middle.

Vertex has greyish-brown scales. The eyes above are surrounded by white scales.

Legs.—Femora and tibia exhibit light spots and stripes on a dark ground on their exterior and extensor sides; the tarsi and their joints have narrow light rings, the terminal joint of the first pair darkened, that of the last pair of legs lighter. The first tarsal joint, also, of the first pair is ringed with light at the end.

The body of the specimen before me has been too much rubbed for me to give an opinion as to its markings. The skin of the thorax is grey in front, with a reddish tinge. The chitinous plates of the abdomen have a couple of white spots on their anterior half and a whitish stripe down the centre of the posterior half. The last but one segment of the abdomen is beset on the posterior margin of the venter with scales.

The genital claspers of the ♀ are compressed, and at their base there is a short process beset with strong bristles.

Thorax + abdomen.—4·3 mm.

Head + proboscis.—2·8 mm.

Length of the four palpal joints, 0·7—0·8—0·5—0·25 mm.

♂. Club of the palpi on the upper surface white with a dark ring. The thickened end of the second joint is white on the upper surface, as is the long tuft of hair beneath the clubs and the first palpal joint.

The upper fork cell is visibly shorter, the place of division being nearer the tip of the wing than the lower fork.

The larger unguis of the first pair of legs have, besides the tooth in the middle, a second one at their base.

Habitat.—East Africa: Dar es Salaam and Mballa Plain, south of Victoria Nyanza. South-west Africa: Franzfontein."

Remarks.—I have not seen this species; but, judging from the description, it is very distinct. It differs in two important points from its nearest ally, *P. cinereus*, Theobald. First, because the femora and tibiae of *merus* have light spots and stripes which never occur in *cinereus*; and secondly, the pale fringe spots are very broad, but in *cinereus* they are narrow. Beyond this I can find no difference at all. In my description of *cinereus* I omitted to mention the two small black basal spots shown now in Plate I.

It does not in the least resemble my *Cellia Pharoensis*, as Dönitz says. Nor does it resemble Loew's *costalis*. How it could bear resemblance to *both* of these totally different insects I fail to comprehend, and I cannot but feel that Dönitz must have been thinking of some other insect when he made such a statement.

GENUS 6. *ARRIBALZAGIA*. nov. gen.

(Plate V.)

Closely related to *Myzorhynchus*, but the single species looks very distinct.

Thorax with curved hair-like scales, and a few narrow curved ones in front; abdomen with large apical lateral scale tufts and scaly venter; wings with thick lanceolate scales. Palpi densely scaled. The clypeus is apparently of peculiar form. Legs much banded and speckled. A single species only of this genus occurs. No scaly ventral apical tuft can be detected. It differs mainly from *Myzorhynchus* in having distinct lateral scale tufts.

ARRIBALZAGIA MACULIPES. n. sp.

Thorax brown, with pale scales; palpi densely black scaled, with three narrow white bands and a minute white apex. Abdomen dark brown, the segments with lateral tufts of black scales. Legs dark brown, spotted with white, the hind tarsi with apical and basal white banding as well. Wings mostly dark scaled, with a few small yellow patches, costal border dark,

with several small pale spots; three more or less pronounced dark patches on the costal border.

♀. Head dark brown, with deep brown and grey upright forked scales, the dark ones grey at the tips, a faint pale border round the eyes and a tuft of hair-like pale scales in front; antennae deep brown, basal joint black, with narrow curved white scales; clypeus brown, of peculiar form; palpi densely scaled with black scales, with three narrow white scaled bands, a white apex and a few scattered white scales; proboscis deep brown.

Thorax brown, with a slaty-grey sheen showing brown longitudinal lines and with small brown specks and narrow hair-like golden curved scales; there is a dark patch joining the scutellum which is carried on to its mid lobe, the rest of the scutellum being slaty-grey, with a few narrow hair-like golden scales; metanotum deep brown, with a median dark line; pleurae brown, with a grey sheen in places.

Abdomen black, with deep brown and golden-brown hairs, the dorsum nude, but each segment with an apical lateral tuft of black scales and a few white ones on the last few tufts; venter with many white and black flat scales, and also to some extent the apical segment. Legs deep brown, banded and spotted with white; fore legs missing; mid legs with the femora, tibiae, metatarsi and first tarsal with white spots, the second tarsal with a small median white spot, the apical tarsal faintly pale; hind legs with the femora, tibiae, and metatarsi banded and speckled with white and the tarsi with prominent white apical and basal bands.

Wings with thick lanceolate and clavate scales (Plate V.), mostly black, yellow patches as follows: ten small ones on the costa, the two apical ones only spreading as two small spots on to the first long vein; traces of one on the upper and two on the lower branches of the first fork-cell, one at the apex of the third and two on each branch of the second fork-cell; fringe brown, a pale spot where the lower branch of the fifth vein joins the border of the wing, another between the upper branch of the fifth and the lower branch of the fourth and between its upper branch and the third (remainder damaged); first sub-marginal cell longer and narrower than the second posterior cell, its base considerably nearer the base of the wing than that of the latter; mid-cross vein about its own length nearer the base of the wing than the supernumerary, the posterior not quite half its length

distant from the mid ; the supernumerary is just beneath the junction of the sub-costal and costal ; the black wing scales from two pronounced black patches on the costa, and a third less



a.



b.

Fig. 51.

a, *Arribalzagia maculipes*. ♀. n. sp.

b, *Cycloleppipteron mediopunctatus*. ♀. n. sp.

prominent one may be noticed ; halteres with bright brown stems and jet black knobs with some grey scales.

Length.—6·5 mm.

Habitat.—Sao Paulo, Brazil (Lutz) ; Trinidad (Urlich).

Observations.—Described from a single ♀ sent me by Dr. Lutz as a new *Cycloleppipteron* by mistake. It is a very marked and beautiful species, with much banded and speckled mid and hind legs. The wings are very dark, and the large number of minute yellow costal spots is very characteristic.

I cannot make out the structure of the clypeus with any degree of certainty, but from what I can see in this single specimen it is of very peculiar form.

It bears a great resemblance to *Cycloleppipteron mediopunctatus*, but can be told by the absence of inflated wing scales and the different positions of the cross-veins and fork-cells (fig. 37). It stings after sunset, and is most common in the littoral. It is almost certainly a malaria bearer, writes Dr. Lutz. A specimen was sent also whilst this volume was in the press from Trinidad, and others from Brazil.

GENUS 7. **MYZORHYNCHUS.** Blanchard.

ROSSIA. Theobald.

(Comp. Rend. Heb. Soc. Biologie, No. 23, p. 795, 1902; Jour. Trop. Med. p. 181, 1902.)

(Plate V.)

Thorax with hair-like scales; prothoracic lobes with ragged scales; the abdomen with ventral and a few apical scales, and a ventral apical tuft; there are no lateral scale tufts to the segments (fig. 1, 7); wing scales broadly lanceolate or moderately lanceolate, sometimes short and broad; palpi densely scaled in the ♀ and also the proboscis.

Wild species breeding in swampy ground. Larvae with much branched frontal hairs. Mostly large and dark species.

A number of closely related forms occur here, the two most marked species being *barbirostris* and *sinensis*.

This genus was renamed by Blanchard owing to my name having been previously used by Owen in 1838.

TABLE OF MYZORHYNCHUS.

A. Palpi unbanded.

Last hind tarsus brown.

Legs with apical pale tarsal bands.

One fringe spot	<i>barbirostris</i> , Van der Wulp.
-----------------------	-------------------------------------

Several fringe spots	<i>Bancroftii</i> . Giles.
----------------------------	----------------------------

No fringe spot	<i>umbrosus</i> . n. sp.
----------------------	--------------------------

Last hind tarsus white	<i>albotaeniatus</i> . n. sp.
------------------------------	-------------------------------

B. Palpi banded.

α. Last hind tarsus brown.

Wing fringe with one pale spot	<i>sinensis</i> . Wiedemann.
--------------------------------------	------------------------------

Wing fringe unspotted.

Palpi with four pale bands, apex white.

Wings with two yellow costal spots.

Wings distinctly spotted	<i>vanus</i> . Walker.
--------------------------------	------------------------

Wings without prominent spots	<i>pseudopictus</i> . Grassi.
-------------------------------------	-------------------------------

Wings with two white costal spots	<i>minutus</i> . n. sp.
---	-------------------------

Apex of palpi black.....	<i>nigerrimus</i> . Giles.
--------------------------	----------------------------

β. Last two hind tarsi white

.....	<i>Mauritianus</i> . Grandpré.
-------	--------------------------------

Last three hind tarsi white	<i>paludis</i> . Theobald.
-----------------------------------	----------------------------

MYZORHYNCHUS MAURITIANUS. Grandpré.

Anopheles Mauritianus. Grandpré.*Anopheles paludis*, var. *similis*. Theobald.*Anopheles tenebrosus*. Dönitz.

("Les Moustiques," Planters' Gazette Press, Port Louis, 1900, Grandpré et Charmoy; Mono. Culicid. I., p. 129, 1901 (var. *similis*); Beit. z. Kennt. der Anop., p. 53, 1902, Dönitz (*tenebrosus*).)

From a careful examination of fresh material from Mauritius and Central Africa, I am sure it is quite a distinct species to my *A. paludis*. It was only in the final page that I saw Grandpré's description, which antedates that of mine (var. *similis*).

This species, which I previously pointed out may have two, three, or four rings of white scales on the palpi, has normally four white rings, the apex being white, and there are also some median basal white scales. When a smaller number of bands are present I find it is due to denudation of the palpal

The species is quite distinct, and may be told by the four palpal bands, by the last two tarsi only being all white and the absence of the pale wing spot, and thus differs from *paludis*, Theobald, and *albotaeniatus*, Theobald.

The Pretorian specimens differ slightly in having more dark wing scales, which partly obliterate the distinctness of the spots, and by having the two black spots on the sixth long vein united into one long black scaled area, but surely cannot be separated as a distinct species for this. Dönitz describes a specimen from Wadi Natrûn, Upper Egypt, as *A. tenebrosus*. I can detect nothing of structural difference from *Mauritianus* of Grandpré; his figure of the wing agrees in every way.

Colonel Giles evidently examined some other species, for in the second edition of his "Handbook of Mosquitoes," p. 296, he says: "The white scaled decoration of the thorax is much better defined" (i.e. than in *paludis*), neither have white thoracic scales, but narrow hair-like golden ones.

Additional localities.—Pretoria (Dr. Theiler), showing slight variation; Bahr el Ghazal (Cummins) and Wadi Natrûn, Lower Egypt (Dönitz); Uganda (Dr. Moffat); Mauritius (Grandpré, Charmoy, and d'Emmerez).

MYZORHYNCHUS PALUDIS. Theobald.

Anopheles paludis. Theobald.

(Mono. Culicid., Vol. I., p. 128, 1901.)

Additional localities.—Bahr el Ghazal (Cummins).

In the description of this species, p. 128, for (yellow curved scales on thorax), read (yellow hair-like curved scales).

MYZORHYNCHUS BARBIROSTRIS. Van der Wulp.

Anopheles barbirostris. Van der Wulp.

(Plate III.)

Additional localities.—Canara District, on the Goa frontier, India (E. H. Aitken); Kuala Lumpor, Malay States (Dr. Durham).

Observations.—In some specimens the legs seem quite as described by Van der Wulp—"testaceous." The prothoracic lobes, I find, have dense tufts of large black scales projecting forwards. The abdomen has a dense tuft of black scales on the apex of the venter. The apical costal spot is to some extent carried across the apex of the wings as a pale band.

The larva and its habits.—The larva differs from *M. sinensis* only in the shape of the frontal hair-tufts, and it has also a branched lateral antennal hair. The frontal hair-tufts are more regular than in *sinensis*, and are composed of a number of radiating hairs (fig. 4, f) on each outer side and a median single pair. It is usually dark in colour, with a light collar and a light band at the third abdominal segment, most prominent in the young. Sometimes there is a broad silvery dorsal stripe.

"But colour is a very unsafe guide," writes Mr. Aitken of this larva; "form and habitual attitude can be trusted, and, in the case of *barbirostris*, serve to distinguish it almost at a glance from all the larvae of *Rossii* type. The thorax is small, scarcely exceeding the head in breadth, the head is elongated, and the abdominal segments are nearly equal, so that the insect looks long and worm-like when compared with the larvae of *Rossii*. This appearance is enhanced by its attitudes, which are less rigid even when it is floating at rest. When browsing on confervae, which appear to be its principal food, it lies like a snake. It appears to feed very little on the surface. I found this species in a rocky pool in one stream, and amongst dense grass and weeds in another."

The palmate hairs are shown in fig. 25, 1, p. 47.

MYZORHYNCHUS UMBROSUS. n. sp.

Closely allied to *barbirostris*, but differs in having only one costal spot, and a more pronounced yellow and black apical fringe, no pale fringe spot, and in the paler wing scales and absence of white scattered scales over the wing field.

♀. Head black, with a few upright grey scales in front, black at the sides and behind, narrow white scales between the eyes and a few yellow hairs in front; palpi densely black scaled; antennae black, basal joint and next few following with black scales.

Thorax blackish, with traces of linear ornamentation, and golden hair-like curved scales, and a tuft of median grey ones in front, prothoracic lobes with black upright ones and also some projecting from the front of the mesonotum; scutellum grey, darker in the middle; metanotum deep brown.

Abdomen steely-black, with brown hairs.

Legs testaceous, with brown scales to almost black, the joints with small pale bands, involving both sides of the joints.

Wings with the costa black, broken by a single small yellow spot at the apex, with a prominent yellow spot at the end of the lower branch of the second long vein extending up the third long vein; the small costal spot extends on to the first long vein and partly on to the upper branch of the second long vein; there is a pale spot on the lower branch, remainder of the first



Fig. 52.

Wing of *Myzorhynchus umbrosus*. (♀). n. sp.

and second long veins black, the other veins mostly pale scaled, with a few scattered dark ones and dark spots as follows:—at the base of the third long vein, at the apices and base of the second fork-cell, stem pale, but the basal part of the fourth vein black scaled; fifth long vein with two dark patches on the upper branch, and one large one at the apex of the lower branch and two spots on the sixth; fringe all dark, no pale spots where the

lower branch of the fifth joins the costal border; first sub-marginal cell much longer and narrower than the second posterior cell, its base much nearer the base of the wing; cross-veins wide apart, the mid more than its own length nearer the base than the supernumerary, the posterior nearer the base than the mid cross-vein; border-scales dusky. Halteres pale, with fuscous knob.

Length.—5 mm.

Habitat.—Penhang, Malay States (Dr. Durham).

Time of capture.—October.

Observations.—Closely related to *barbirostris*, but has only one costal spot, no pale fringe spot, and no white scattered scales at the base of the wings. The veins have also a paler appearance, due to there being fewer dark scales.

MYZORHYNCHUS ALBOTAENIATUS. n. sp.

(Plates I. and V.)

This species differs from *barbirostris* in the marked banding of the hind legs. The hind tibiae and metatarsi have a distinct pure white apical spot, and also small basal spots; the first tarsal is narrowly white banded basally and apically, the second and third tarsals are broadly white banded basally and apically, the narrow jet black ring in the middle of each being very prominent, the last tarsal is pure white.

The legs are as usual long and spidery. The palpi, like *barbirostris*, are unbanded, and the wing fringe has no pale spot.

Locality.—Perak, Straits Settlements (Dr. Wright).

Observations.—The wing scales (Plate V.) are of typical *barbirostris* form, and the venation is similar, but the marked leg banding at once separates this species.

MYZORHYNCHUS BANCROFTII. Giles.

Anopheles Bancroftii. Giles.

(Handbk. Gnats, 2nd ed., p. 511, 1902.)

♀. Head black, with dark narrow curved and forked upright scales; antennae, palpi, and proboscis deep black, the two latter densely scaled; thorax black, with rather dense, long, golden brown hairs; pleurae mottled, with black and pale brown. Abdomen black, with golden brown hairs; venter black.

Wings deep black, with a small white interruption of the costa opposite the middle of the fork-stems and a slightly larger patch of white on the apex; veins dusky and white scaled, the former predominating; two prominent white areas on the sixth long vein, on the other veins are here and there scattered white scales, but never enough to form a well marked pale area; fringe with pale areas where the veins join the costa except at the end of the sixth.

Legs black, the tarsi with very small apical pale bands.

Length.—7 mm.

Habitat.—Bupengary, Queensland (Dr. Bancroft).

Observations.—Giles described this from a single ♀ in the British Museum. It bears a very strong resemblance to *M. barbirostris*, but has all the areas of junction between the veins and costal border pale except the sixth.

MYZORHYNCHUS SINENSIS. Wiedemann.

Anopheles sinensis. Wiedemann.

(Mono. Culicid. I., p. 137, 1901.)

Note re previous description.—To the previous description may be added the following: "The apical costal spot extends evenly on to the upper branch of the first fork-cell, the upper branch of the fifth vein with an apical spot, a small basal one where it joins the lower branch, another small dark one near the cross-vein and a longish patch of paler brown scales between this and the apex."

On the apex of the venter of the abdomen a tuft of large black scales.

Additional localities.—Shaohyling, China (Cornford).

Time of capture.—June.

This species differs from *M. vanus* in having, (i) a pale spot where the upper branch of the fifth long vein joins the costa; (ii) it is larger; (iii) and in position of the cross-veins. The latter a doubtful character however.

Fig. 53.
Palp of ♀
M. sinensis.

MYZORHYNCHUS VANUS. Walker.

Anopheles annularis. Theobald (*non* Van der Wulp).

(Mono. Culicid. I., p. 142, 1901.)

The specimens described as *annularis*, Van der Wulp, in the first volume are certainly not that species. I cannot imagine how I committed such an error, unless it was on account of Van der Wulp's statement that it might be identical with *A. sinensis*.

Three very important characters given by Van der Wulp at once dispel the notion of any connection between the two, viz. : (i) *annularis* has the whole of the apical palpal joint white ; (ii) costa alternately spotted with dark brown and white ; (iii) the long hind tarsi fuscous in the middle and with a white ring, wholly white towards the end.

The specimens that I took in error to be *annularis* must be known therefore under Walker's name.

This species bears a very close resemblance to the Chinese *M. sinensis*, but is very much smaller and differs in having no pale fringe spot, and in the two costal spots being smaller, and the palpal banding is not so distinct.

Unless the larvae are shown to be distinct, I feel more disposed to treat it as a permanent small form of the Chinese *sinensis* than as a distinct species.

To the description given on p. 142, Vol. I., add the following :—“ Bases of the antennae with pale scales ” ; “ palpi with the apex white and two other prominent white rings and some white scales towards the base,” the “ basal border-scales are sometimes brown as well as yellow,” “ the second small spot (costal) more or less extending on to the *first* (not second) long vein,” and the pale area extending some distance basally under the dark costa.

The palpal banding referred to as being variable in Vol. I., p. 144, often has an accessory band, so that it is generally four-ringed ; the fourth basal ring may be reduced gradually down through a few white scales until it disappears, and the second small one at the apical end is often indistinct.

Additional localities.—Quilon (James) ; Lahore (Christophers) ; Perak (Wright) ; Penang, Putar Jerejah Asylum (Freer) ; Dindings, Straits Settlements ; Kuala Lumpor (Durham) ; Luzon, Philippine Islands (Ludlow).

Times of capture.—Quilon, 27.7.01 ; Luzon, 7.9.01.

The larvae have very peculiar frontal tufts (fig. 4, e), the outer ones bushy, the inner feathery.

Observations.—Walker's types of *vanus* are very damaged, but enough remains to identify the species.

MYZORHYNCHUS MINUTUS. n. sp.

Thorax slaty-grey, with three darker brown lines and pale hair-like scales; palpi densely black scaled, with four narrow white bands, one apical; proboscis black. Abdomen deep brown, with pale golden hairs and a tuft of black scales beneath the penultimate segment. Legs brown; metatarsi and tarsi with narrow white apical bands. Wings with two white costal spots, and a third on the first long vein nearly reaching the costa towards the base, apex all yellow, veins with yellow and black scales.

♀. Head brown, clothed with grey upright forked scales in the middle behind, in front they become almost long curved scales, a few ochraceous upright forked scales at the sides, a tuft of white hair-like scales projecting forwards over the eyes; palpi densely scaled, apex white and with three other small basal white bands; proboscis black; antennae deep brown, the basal joint and next few following with white scales.

Thorax slaty-grey to brown in some lights, with three darker brown lines, covered with scattered golden hair-like scales; surface with minute black specks as in the type; scutellum paler, with hair-like golden scales and brown border-bristles; metanotum deep brown; pleurae brown with greyish reflections.

Abdomen black, with some paler testaceous mottling, covered with golden hairs and with a tuft of black scales beneath the penultimate segment. Legs deep brown, the anterior and mid with apical white bands to the metatarsi and first two tarsi, the hind with apical bands to three of the tarsi.

Wings with the costa black, with two clear pure white spots, which spread on to the first long vein and the faintest trace on to the upper branch of the first fork-cell; the first long vein has the white spot beneath the second costal spot prolonged into a line and has another smaller white spot nearer the base of the wing, not reaching the costa; second long vein and the branches all black scaled, except a few white ones on the upper branch under the costal spot; third long vein nearly all yellow scaled, a few black ones dotted about along it; fourth vein black at the

base, mottled black and yellow before the fork, the fork black at the base and at the tip of each branch and with a few black scales dotted over the remaining yellow areas ; the fifth mostly yellow, a distinct black patch near the base, with scattered black scales on the upper branch, lower branch all yellow except a black spot at the tip ; sixth vein with the apical half black, the basal half yellow ; fringe black, unspotted, apex yellow, border-scales yellow ; first sub-marginal cell longer and narrower than the second posterior cell, their bases nearly level, base of the first sub-marginal some little distance from the second costal spot. Halteres with pale stem, and fuscous knob with small pale scales.

Length.—4·5 mm.

Habitat.—Lahore, Punjaub (Dr. Christophers).

Observations.—Described from a single ♀. It is a very distinct gnat, but presents no structural difference from any others of the *sinensis* group. It can at once be told by the white costal spots, strongly contrasted against the yellow and black scaled wings. The first sub-marginal cell being all black is also characteristic.

GENUS 8. **NYSSORHYNCHUS.** Blanchard.

LAVERANIA. Theobald.

(Comp. Rend. Soc. Biologie, No. 23, p. 795, 1902 ; Jour. Trop. Med. 1902.)

(Plate V.)

Thorax with narrow-curved and spindle-shaped scales. Abdomen with ventral scales and also scales on the apical segment and sometimes dorsal apical patches. Wing scales bluntly lanceolate, short, some more elongate and narrow (Plate V.) ; palpi densely scaled. Legs banded and spotted with white, the hind tarsi usually with one or more pure white joints.

The larvae are mostly pot and puddle-breeding species, but some breed in marshes ; the adults mostly domestic, but some are wild.

This genus was renamed by Blanchard, as my name had been previously used by Grassi and Feletti in 1890.

The scales on the abdomen vary ; some are small and spatulate, others long and thin ; some have a fair number of abdominal scales, others only on the apical segment ; they are never as prominently scaled as *Cellia*, nor are the wing scales similar.

NYSSORHYNCHUS FULIGINOSUS. Giles.

Anopheles fuliginosus. Giles.*Anopheles Jamesii*. Liston (non Theobald).*Anopheles leucopus*. Dönitz.

(Handbook of Gnats, p. 160, 1900, Giles; Mono. Culicid., I., p. 132, 1901, Theobald; Ind. Med. Gaz., Dec., 1901, p. 441 (= *Jamesii*), Liston; Insecten Borse, 5. Jahr. 1901, p. 37, Dönitz; and Beit. zur Kenntn. der *Anopheles*, p. 73, 1902, Dönitz.)

(Plate IV.)

Notes.—Liston described this species as *A. Jamesii*. I also feel pretty certain that Dönitz's *A. leucopus* is the same—anyway, the specimen he sent me of *leucopus* was *fuliginosus*. In his recent paper, however, I see he still retains it ("Beiträge zur Kenntniss der *Anopheles*," p. 73, 1902).

This species is subject to great variation, both in wing and leg markings. A typical wing is figured on Plate IV. The larva of this species has branched frontal hairs (fig. 17, 6). The palmate hairs (fig. 25, 2) with long apical terminations.

Additional localities.—Dacca (Lt.-Col. Macrae); Nagpur (Stephens), a ♀ with yellow marks in the place of the usual white ones.

NYSSORHYNCHUS STEPHENSI. Liston.

Anopheles metaboles. Theobald.

(Ind. Med. Gaz., xxxvi., No. 12, Dec., 1901 (*Stephensi*); Proc. Roy. Soc., p. 374, vol. lxix., 1902 (*metaboles*).

Thorax brown, with frosty-grey scales in the middle, the brown forming a broad line on each side. Abdomen deep brown, with golden hairs and small scales. Legs deep brown, speckled with white, joints of the fore and hind tarsi with apical white spots. Wings with the costa with four prominent black spots and two smaller basal ones, and a few small black spots on the veins; fringe dark, with pale areas.

♀. Head dark brown with frosty upright forked scales in front, dark brown ones behind and at the sides; antennae dark brown; palpi deep brown with three white bands, the two apical ones the widest, the whole of the last joint is white; between the second large white band and the small basal one are two minute white ones; proboscis black. Thorax deep brown, with

narrow-curved, flat, pale creamy scales, giving the thorax a frosty appearance in the middle, and a median tuft of white hair-like scales projecting over the top of the head; the sides of the mesothorax dark; scutellum paler brown, with narrow curved pale scales and dark brown border-bristles; pleurae chestnut-brown, with patches of creamy scales.

Abdomen deep brown, with dense dull golden hairs, and scattered small narrow-curved pale scales.

Legs dark brown, speckled with pale creamy spots; apices of the fore tibiae, metatarsi, and first two tarsi yellow, last two all dark brown; in the mid legs the apical spots are scarcely apparent; in the hind more distinct, but the last joint is all dark brown; unguis small, equal and simple.

Wings (figs. 54 and 55) with four large black costal spots, and two smaller ones near the base; the two apical costal spots are continuous on to the first long vein; the third, which is the largest, has three typical spots beneath it on the first long vein (fig. 54, 1); the fourth has one beneath it not quite so long; there are also black spots on the veins as follows: one on the upper branch of the first fork-cell, just below the apical costal spot, another towards the base of the fork-cell, a small one near its

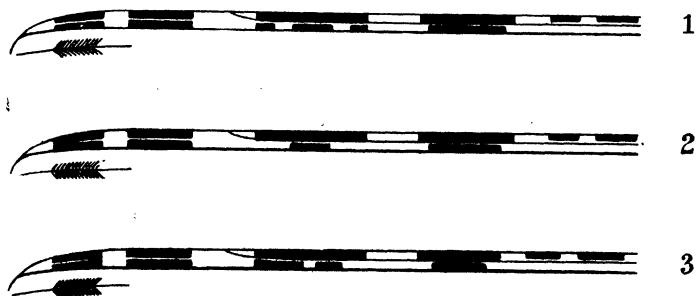


Fig. 54.

Variations in wing markings of *N. Stephensii* (♀).

apex, and two small ones on the stem; two small spots at the base, and one at the apex of the third vein; two on the upper and one on the lower branch of the second fork-cell, and two long ones on its stem; two on the upper, one on the lower branch of the fifth long vein, and one at its base; three small ones on the sixth vein; fringe dusky, partly yellow at the apex, and with a yellow spot at the terminations of the veins; fork-cells short, base of the first sub-marginal slightly the nearer to the

base of the wing, its stem nearly as long as the cell ; stem of the second posterior longer than the cell ; supernumerary cross-vein nearly its own length in front of the mid cross-vein, the posterior



Fig. 55.
Wing of *N. Stephensi* (♀).
(From Proc. Royal Society.)

cross-vein longer than the mid, nearly twice its own length distant from it, sloping towards the base of the wing.

Length.—3·5 to 4·5 mm.

Habitat.—Lahore, India.

Observations.—Described from five ♀'s sent by Captain James and Drs. Christophers and Stephens. It comes near *N. maculatus*, Theobald ("Mono. Culicidae," Vol. I., p. 171), but can at once be told by the last hind tarsi not being white as in that speckled-legged species ; from the speckled-legged *N. Theobaldi*, Giles ("Ento. Mo. Mag.," p. 198, 1901), and *N. Jamesii*, Theobald ("Mono. Culicidae," Vol. I., p. 134), also by the hind tarsi not being white. The third spot on the border of the wing is subject to some variation, as shown in fig. 54. One specimen has only two spots on the sixth long vein, not three. Just previous to my description the species also sent to Capt. Liston was described in the *Indian Medical Gazette*.

The *larva* has short palmate hair-filaments like *Theobaldi* and *maculatus* (fig. 25, 6), and simple frontal hairs (fig. 17, e).

The name *metaboles* occurs in all the Royal Society Reports, Liston's description not being then known.

NYSSORHYNCHUS THEOBALDI. Giles.

Anopheles Theobaldi. Giles.

(Mono. Culicid. II., p. 311, 1901.)

(Plate IV.)

Additional localities.—Dacca (Lt.-Col. Macrae), Nagpur (Stephens); Punjab (in rice-fields, 26th October, 1900); Sambalpur, Central Provinces (Murphy).

Observations.—A ♀ from Nagpur differs from the type in the following: (1) the tip of the palpi have black scales over a white ground; (2) the tip of the proboscis is dusky white; (3) the mid legs have apparently no white marks. Dr. Stephens writes regarding this species: "We found it at Nagpur, Central Provinces, the day we left. We had not noticed it previously, so were unable to say whether it was rare or we had overlooked it."

The *normal palpi* have three white bands, apex white, the second white band between the junction of the apical and next joint; the third white band is at the junction of the next two joints.

Col. Giles says "abdomen *nude*, hairy"; this is not accurate, for the apical segments have small flat scales of a dull golden hue.

The larva has simple frontal hairs (fig. 4, b) like *Stephensi* and *maculatus* and also short filaments to the palmate hairs (fig. 25, 3).

The Nagpur specimen is probably a distinct species.

A typical wing is figured on Plate IV.

NYSSORHYNCHUS MACULATUS. Theobald.

Anopheles maculata. Theobald.

(Mono. Culicid. I., p. 171, 1901.)

Additional localities.—Perak (Wright); Dindings, Straits Settlements.

Time of capture.—November at Dindings.

NYSSORHYNCHUS MACULIPALPIS. Giles.

Anopheles maculipalpis. Giles.

(Handbk. Mosq., 2nd ed., p. 297, 1902.)

(Plate II.)

Col. Giles described the ♂ only; the following is a description of the ♀.

Black and white. Thorax with narrow-curved white scales. Abdomen hairy, with a few scales. Palpi with two broad white bands, one apical, and a third narrow band towards the base, remainder spotted with white. Legs black, spotted with white; last three hind tarsi pure white, and apex of the next. Wings with most of the veins black-scaled, with a few small white areas; costa black, with five white spots.

♀. Head black, with upright white forked scales in the middle, similar black ones at the sides, white curved scales in the middle in front, and a tuft of long white ones projecting forwards; antennae black, the first four basal joints with white scales, basal joint also with black bristles; remainder of the joints with pallid and brown hairs and pubescence; palpi black, ornamented with white, as follows: a narrow apical ring on the long second joint, which is densely scaled with black and a few pale scales; the third joint with a broad apical white band and white spots of scales; the fourth joint white at the base and apex; the fifth all white; the palpi thus present a triple-banded appearance, the two apical bands broad, the basal narrow, and with part of the palpi spotted; proboscis black; clypeus black.

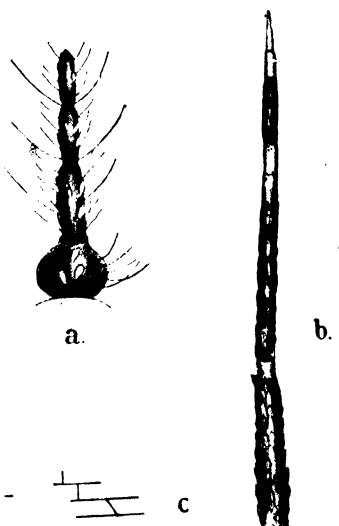


Fig. 56.

Nyssorhynchus maculipalpis, Giles.

a, Base of ♀ antenna; b, female palp; c, cross-veins of ♀.

Thorax black, with scattered narrow-curved and small narrow flat white scales, and short golden hairs and dark brown bristles; scutellum black, with similar white scales; pleurae deep and bright brown; metanotum black.

Abdomen black, with dense blackish-brown hairs, a few scales only on the apical segment, remainder bare and shiny.

Legs black, with the femora and tibiae, and to some extent the metatarsi, with small clear white spots, first fore tarsi with apical white bands, mid tarsi plain; in the hind legs the last three and apex of the first tarsi pure white; ungues equal and simple.

Wings (Plate II.) clothed with mostly dusky-black narrow elongate slightly clavate scales, with some white areas, as follows: on the costa five pure white spots, the two apical ones and the fourth spreading on to the first long vein, which is also white at the base, a small white patch on the lower branch of the first fork-cell, a few white scales at the base of the fork; a small white spot about the middle of the third long vein and another

near its base ; one small white spot on each branch of the second fork-cell and one at the base ; three fair-sized white spots on the upper, and one large one on the lower branch of the fifth, and two on the stem ; apex and base of the sixth white, and a broadish median white spot ; fringe apparently all black ; first sub-marginal cell longer and narrower than the second posterior cell, its base slightly nearer the apex of the wing than that of the second posterior ; supernumerary cross-vein half its length nearer the apex of the wing than the mid, the mid cross-vein about twice its own length distant from the posterior cross-vein ; stem of the first sub-marginal about two-thirds of the length of the cell ; stem of the second posterior longer than the cell. Halteres with brown stem and fuscous knob.

Length.—5·5 mm.

Habitat.—Mauritius (Grandpré), Mashonaland (Marshall), and India (Stephens and Christophers).

Observations.—Described from a nearly perfect ♀ sent by MM. Grandpré and Daruty. It is a very beautiful species ; the markedly spotted palpi and legs will at once separate it from all known members of this genus.

Specimens (Plate IV.) have been sent by Drs. Stephens, Christophers, and James of what is evidently this species, labelled *Anopheles Jamesii*, Theobald, and probably some of the larval characters described by them belong really to this species. A ♀ has also been received from Mashonaland, exactly similar to the Indian ones (a ♂).

The larval characters described by Christophers and Stephens for *Jamesii*, Theobald, are as follows : Frontal hairs show signs of branching, and the palmate hairs have short filaments like *Stephensi*, but it is most nearly related by larval structures to *maculatus* and *Theobaldi*.

I am not at all sure if this really refers to the small species, *A. Jamesii*, Theobald, or to the specimens labelled *Jamesii* received from Dr. Christophers, which were a variety of *maculipalpis*.

Captain James noted this latter as

being distinct, however, for in one of his letters to me he says : " One of these I found at Nagpur. It is very like *A. Jamesii*,

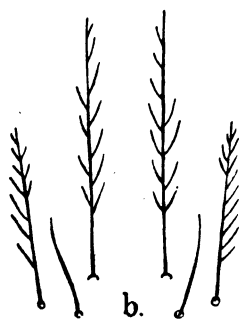


Fig. 57.

Frontal hairs of *N. maculipalpis*.
(*Jamesii* of Stephens and Christophers?).

but the wing and leg-markings differ, and it is more speckled (the palpi as well as the legs are speckled). It also has two equal broad bands on the palpi, and one narrow one" (March 20.02).

Var. *INDIENSIS*.

Resembles the type in all respects, but the hind legs are not quite so banded. There is some variation in the wing-markings.

These specimens were sent over by Dr. Christophers, labelled *A. Jamesii*, Theobald. They are double the size of that species and much darker, and cannot well be confounded with it.

This species also seems to have been taken in the Canara district by Mr. Aitken.

NYSSORHYNCHUS PRETORIENSIS. n. sp.

(Plate V.)

Closely related to *N. maculipalpis*, but the palpi are not mottled and are somewhat longer; the two white apical bands are further apart. The hind tarsi have also different ornamentation; the second hind tarsus has a small black patch near its base; the metatarsus is mottled with white and black, and has a broad white apical band like the first tarsal. The last two hind tarsi only being all white.

I can detect no structural differences from *maculipalpis*; but the absence of spotted palpi will at once separate it, and also the less scaly nature of the palpi, and the differently adorned hind tarsi. The wing scales are shown on Plate V.

Length.—As in *maculipalpis*.

Habitat.—Pretoria (Dr. Theiler).

Observations.—Described from a large series sent by Dr. Theiler, per Colonel David Bruce, F.R.S. It is subject to much variation, and is closely related to *N. maculipalpis*, but the unspotted palpi at once separate it. Moreover, the larvae have simple frontal hairs; and thus, if I am right in placing the *Jamesii* of the Royal Commission Reports as the *maculipalpis* of Africa—and I cannot see my way to do otherwise—it is clearly distinct; for in the Indian species, and presumably the species in Africa, with speckled palpi, the frontal hairs of the larva are not all simple (compare figs. 57 and 58).

Dr. Theiler observed this species first on the 10th of February, and it gradually became more prevalent, superseding the other common species (*cinereus*) in April.

This is called by Theiler the Black *Anopheles* of Pretoria.

Probably another species closely related.—One specimen in the series has the last palpal joint black at the base—so there are four, not three, pale bands; the wings are also darker scaled, the third long vein being entirely black. But, until I see more material and the larvae, I scarcely like to separate it, as I can detect no structural differences.

Larva of Nyssorhynchus Pretoriensis.

The larva at once separates this species from the Indian relative, although adult characters are so near.

The frontal hairs are all simple (fig. 58, b), the outer ones very short, the median long and thin.

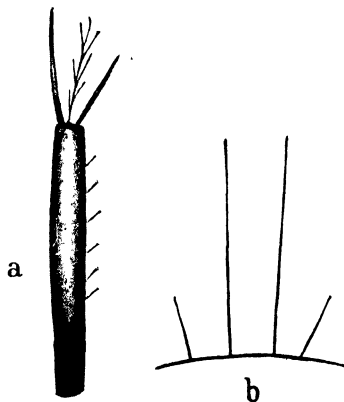


Fig. 58.
a, Antenna, and b, frontal hairs of larval
N. Pretoriensis, n. sp.

The antennae (a) have apparently no lateral tuft, but two terminal spines, one longer than the other, and a branched intermediary plume-hair.

NYSSORHYNCHUS WILLMORI. n. sp. James.

The following is Captain James's description :—

Palpi with three white bands. Thorax dark brown, covered with white scales and hairs. Abdomen brown, with many golden scales and hairs. Legs deep brown, thickly speckled with white; the last tarsal segment of hind leg pure white. Wings spotted.

♀. *Head* black, with some upright white scales; antennae light brown, with white hairs; palpi scaled and with three white bands, the two terminal of which are equal and broad and the third narrow; proboscis dark brown.

Thorax dark brown, covered with white scales and a few hairs; pleurae black; scutellum with a few white scales and long bristles.

Abdomen deep brown, with many golden hairs and scales; the scales and hairs on the last segment are very closely packed together, so that this segment is almost entirely of a golden brown colour; some of the scales which project from the sides and termination of this segment are dark brown in colour.

The *Halteres* carry a number of short thick scales.

Legs dark brown, thickly speckled with white spots; in the fore and mid legs there are apical white bands to the femora, tibiae, and all the tarsal segments except the fourth and fifth; the

Fig. 59.

♀ palpi of a, *N. maculatus*, Theobald; b, *N. Willmori*, James.



Fig. 60.

Nyssorhynchus Willmori. n. sp. (James).

a, scales from haltere; b, upright scales of the head; c, wing scales; d, abdominal scales.

femora, tibiae, and first and second tarsal segments are brilliantly marked with bands and patches of white scales, the apical banding of the first, second, and third tarsal segments extends over the joint to the base of the next segment. In the hind legs, the femora, tibiae, and first tarsal segment are thickly speckled with white patches; the tibiae and first tarsal segment have apical white bands, and the second, third, and fourth tarsal segments have white apical and basal bands; the last tarsal segment is wholly white.

The *Wing* veins are clothed with black and white scales; the costa shows four large and three small black areas, the latter being near the base of the wing; the first longitudinal vein has four black spots corresponding to the large dark areas on the costa, the second longitudinal vein has three small dark spots on its main stem and two on each of its branches; the third longitudinal vein is white scaled except for a small dark spot at its commencement and another at its termination; the fourth longitudinal vein has three dark scaled areas on its main stem and two on each of its branches; the fifth longitudinal vein has a small spot at its commencement, two spots on its anterior branch and one on its posterior; the sixth longitudinal vein has three small dark spots.

The *Wing fringe* is interrupted by light scaled areas at the terminations of all the longitudinal veins.

Habitat and Observations, collected by Lieut. Willmore, I.M.S., in Kashmir. Its larvae were found in a clear puddle formed by a spring at a height of 4800 feet. It differs from *A. metaboles* (Theobald) in its abdomen being more thickly scaled and having fewer hairs, as well as in the wing markings and in having the last segment of the hind tarsi pure white. From *A. maculata* it differs in having a thickly-scaled abdomen.

Observations.—This species bears a very striking resemblance to *N. maculatus* (Theobald), but differs not only in regard to the densely-scaled abdomen, but also in the banding of the palpi, which have two broad and equal apical white bands and a small one towards the base, whilst in *maculatus* there are two unequal white apical bands, then a small white one, and another small white one towards the base.

Dr. Christophers sent me this species from Lahore.

NYSSORHYNCHUS KARWARI. n. sp. (James).

The following is Captain James's original description:—

Palpi with four white bands. Thorax covered with snowy-white scales and some hairs. Abdomen thickly clothed with golden hairs and some scales on the last two segments. Legs not speckled; the terminal tarsal segment of the hind legs pure white.

♀. Head with white upright forked scales in front and dark ones behind; a small tuft of white hairs projecting forwards from the head; palpi thickly clothed with scales and marked with four white bands; tips of palpi white; the two terminal bands are broad and equal, the other two are narrow; antennae black, with silvery hairs.

Thorax black, covered with numerous snowy-white spindle-shaped scales on its dorsal aspect; three longitudinal dark lines devoid of scales can be made out on the dorsum as well as a lateral eye-like bare spot on each side, and a median bare spot posteriorly; pleurae black, with two indistinct longitudinal white lines on each side; scutellum with some scales like those on the thorax, and with bristles.

Abdomen black, thickly clothed with golden hairs; on the last two segments the hairs are very dense and a number of scales are also present on these segments, those which project from the sides of the segments being dark coloured and the others golden-brown; the remainder of the abdomen is devoid of scales.

Wings with veins clothed with black and white scales forming dark and light areas as follows:—(fig. 61) the costa shows four large dark scaled areas and two small ones; the first longitudinal vein shows dark scaled areas exactly corresponding to those on the costa, except that the middle area is divided into three by two small white spots; the second longitudinal vein has

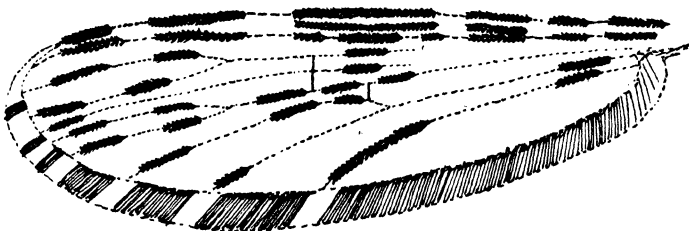


Fig. 61.

Wing of *Nyssorhynchus Karwari*. (♀.) Drawn by Capt. James, I.M.S.

one dark spot on its main stem and two on each of its branches; the third longitudinal vein is white scaled except for a small dark area at its beginning and another at its termination; the fourth longitudinal vein has three small spots on its main stem and two on each of its branches; the fifth longitudinal vein has one small dark area on its main stem, three on its anterior

branch and one on its posterior; the sixth longitudinal vein shows two dark scaled areas; the wing fringe is interrupted by light scaled areas at the terminations of all the longitudinal veins and their branches.

Legs black, in the fore and mid legs each tarsal segment, except the fourth and fifth, has an apical white band; in the hind legs the tibia and the first and second tarsal segments have apical white bands; the third and fourth tarsal segments have both basal and apical white bands, and the fifth tarsal segment is wholly white.

Habitat.—Karwar (Bombay Presidency), Goa.

Time of capture.—Karwar, in June (Dr. Coghill); Goa, in February (E. H. Aitken, 2000 feet).

Observations.—This species differs from *N. maculatus*, Theobald, in the palp markings, and in its unspotted legs, and to some extent in wing markings.

NYSSORHYNCHUS ANNULIPES. Walker.

Anopheles annulipes. Walker.

(Mono. Culicid. I., p. 164, 1901.)

Additional localities.—Port Darwin, South Australia.

Observations.—The *larvae* breed in both salt and fresh water. There are two curved median frontal hairs, then two long

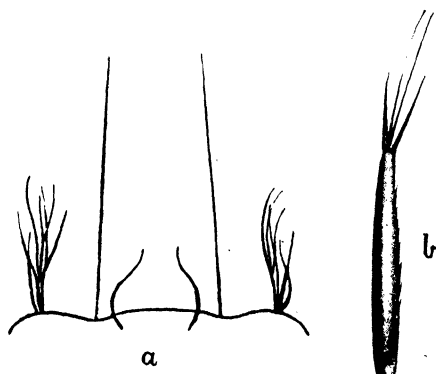


Fig. 62.

Nyssorhynchus annulipes. Walker.

a, Frontal hairs; b, Antenna of larva.

simple ones, and two lateral tufted ones, and the antennae are serrated along one side, the apex with two spines and two

median hairs (fig. 62, 6). One ♂ and ♀ of this common Australian species have the banding of the legs more pronounced than usual. In the ♀ the hind metatarsi are mostly pale scaled, the dark irregular bands being much reduced.

Both specimens were bred by Dr. Bancroft from sea water of sp. gr. 1040. They hatched out on the 10th of January (1901). Dr. Bancroft finds this mosquito will live for a month on dates, whereas on bananas they can only be kept alive for three days.

NYSSORHYNCHUS MASTERI. Skuse.

Anopheles Masteri. Skuse.

(Mono. Culicid. I. 1901, p. 165.)

Additional localities.—Sydney (Froggatt) (2 ♀'s).

Time of capture.—May.

NYSSORHYNCHUS (?) DECEPTOR. Dönitz.

The following is Dönitz's description :—

Diagnosis.—Upper fork commences somewhat earlier than the lower. The terminal half of the proboscis is whitish.

Terminal half of the palpi white, with a narrow black ring at the commencement of the third and fourth joints.

Tibia of the hind legs narrowly white at the end. The tibio-tarsal joint not broadly white.

Marking of wings similar to that of *An. leucophyrus*.

Description of a few specimens from Sumatra :—

♀. Smaller than those of the two varieties mentioned which it resembles. In its wing markings it has more similarity with *An. punctulatus*, because the spots of the membrane which occur over the dark



Fig. 63.

Wing of *Nyssorhynchus (?) deceptor*. (♀). Dönitz.

After Dönitz.

scaly places are lacking. The wings in consequence also appear lighter, because the number of the dark spots is less. The second typical anterior marginal spot appears to be as long as in *leucophyrus*, because

it has amalgamated with the small spot in front of it; but it is narrower because the dark streak situated on the second vein is not joined on. The third spot is longer than in *punctulatus*; in the streak on the first vein the origin is only indicated by three dots. The entire stem of the upper fork has dark scales, but is divided by a sunken light spotlet at the superior central transverse vein into two longish strips.

Of the central transverse veins the inferior one is at a distance of about one-third of its length from the middle one. The superior one is shifted further back. From the inferior central transverse vein the upper branch of the fifth vein and the fourth vein take their departure from each other, evenly and gradually.

Ciliated margin spotty.

Index of the auxiliary vein, 40·9 mm.; of the fifth vein, 36·2 mm.

Length of wing, 2·9 mm.

Halteres white.

Head.—Vertex grey, tuft on vertex lighter. The palpi are from about the middle of the second joint white, with narrow dark rings around the roots of the third and fourth joints. Thus the ring around the light end of the second joint, possessed by *An. punctulatus*, is missing. The first joint is white above.

Length of joints of palpi, 0·46—0·5—0·23—0·13.

The end of proboscis white or whitish.

Thorax as in *leucophyrus*.

Legs similarly marked as *An. leucophyrus*, excepting the hind legs, which carry only a small light spot at the end of the tibia, and not a broad white band such as is characteristic of the other species.

Head and proboscis.—2·0 mm.

Trunk.—3·4 mm.

♂. Unknown.

Habitat.—Sumatra.

Observations.—*An. deceptor* is related to *An. punctulatus*, the species indigenous to New Guinea, which appertains to the Australian fauna; the region of distribution of *deceptor*, as well as of *leucophyrus*, however, lies this side of the border defined by Wallace, thus in the Indian fauna region. It is remarkable that both are seemingly rare species. *Perhaps* both are connected.

In the observations on *An. punctulatus* I have pointed out that the specimens received by Theobald from Malacca, and which he takes for *An. punctulatus*, are not of that variety, and that, therefore, immediately a comparison with *An. deceptor* came into question. Unfortunately Theobald's description, just on these points, are insufficient, so that I have been referred to the illustrations on p. 176 and Table xxxvii., fig. 148. The markings of the thorax in it does not correspond, and as regards the wings there are diversities in the structure and in the drawing. In Theobald's specimens, the second vein forks very much later than the fourth, in *punctulatus* and *deceptor* either earlier or at an equal height. I can also add that the transverse veins, on which authors lay

great weight, also do not coincide if they are not drawn quite incorrectly in Theobald's figure. In an *Anopheles* the inferior transverse vein never ceases (?) immediately after the origin of the upper branch of the fifth longitudinal vein. At the same time I must call attention to the fact that the second vein never, as in Theobald's fig. 49a, springs from the root in an *Anopheles*, any more so than the third longitudinal vein as shown in fig. 148, which is coloured. I do not know if in these gross errors in the illustrations I may venture to lay weight on the drawings of the wings, but I will at least mention that in both figures of Theobald's there are missing the dark spot behind the superior transverse vein on the second longitudinal vein, and the spot in front of the inferior transverse vein on the longitudinal vein, both of which are present in *An. deceptor*.

The only other species with which it might be confused owing to the banded proboscis is my *M. albirostris* (p. 24), but the wings are totally distinct.

GENUS 9. *CELLIA*. nov. gen.

(Plate VIII.)

Thorax with flat spindle-shaped scales; abdomen more or less covered with long narrow-curved or spindle-shaped scales irregularly disposed and with dense lateral tufts; palpi of ♀ densely scaly; wing scales large, bluntly lanceolate, wings densely scaled. Easily told by their dense coating of irregular scales, totally unlike a typical *Anopheles*.

CELLIA PULCHERRIMA. Theobald.

Anopheles pulcherrimus. Theobald.

(Proc. Roy. Soc., p. 369, vol. lxix., 1902.)

(Plate VIII.)

Thorax ashy-brown, with frosty grey and very pale ochraceous scales, unadorned, except for two narrow dark lines on the posterior half. Abdomen densely covered with frosty and pale ochraceous scales, darker basal bands and distinct lateral apical tufts of black scales; venter and sides mostly white scaled. **Wings with the fringe mostly pale, with seven more or less distinct dark patches; costal border with four large black spots,** and a few small ones on the yellow-scaled veins. Legs ashy-grey, the fore and mid tarsi and tibiae with apical white bands; in the hind legs, all the tarsi white, except the base of the first.

which is black ; a large white spot, nearly a band, near the apex of the femora. Ungues equal and simple.

♀. Head densely clothed with broad upright forked scales, creamy white in front, rich ochraceous behind ; with a dense tuft of white hairs projecting forwards ; antennae dark brown, with tufts of white scales on the joints, verticillate hairs white ; palpi densely scaly, covered with brown scales and four prominent white rings, the broadest being the apical one.

Thorax brown to ashy-brown, covered with broad, flat, spindle-shaped grey scales, giving it a frosty appearance. Some of these scales have a slight ochraceous tinge in some lights, three distinct tufts of long and some short white scales projecting forwards over the head ; thoracic hairs pale golden ; scutellum brown, with similar scales to the mesonotum, and pale golden border-bristles may be seen when held in one direction, black when held in another ; metanotum brown ; pleurae densely white scaled. (When held in certain lights two dark lines show on the posterior part of the mesonotum, due to two dark lines on the denuded surface.) Abdomen black, densely clothed with flattish scales, the base of each segment nude and thus black, then follows a row of white scales, the remainder rich ochraceous ; at the sides of the apical end of each segment is a tuft of rather long flat black scales ; border-bristles pale ; venter black, with flat white scales. Legs with pale bands ; fore legs with the femora and tibiae grey beneath, with a few brown scales scattered above, metatarsi and first two tarsi with broad apical white bands, last two tarsi and bases of the others dark brown, unguis equal and simple ; mid legs much the same, but the femora dark towards the apex, with a large white spot near the apex, which is black ; apex of tibiae, metatarsi and first two tarsals white, last two deep brown, unguis equal and simple. In the hind legs the femora and tibiae are much as in the mid, the apex of the metatarsus is white, and the whole of the tarsi except a narrow black band at the base of the first joint ; unguis small, equal and simple.

Wings (fig. 64) with the veins mostly clothed with pale creamy scales, with four large black costal spots and two small basal ones, the apical, second and fourth black costal spots extend evenly on to the first long vein, the third has a large median and a small dark spot at each end ; there are also small black spots on the veins as follows :—One at the base of the first fork-cell, one at the base and another at the apex of the third long vein ; two on each branch, and three on the stem of the

second fork-cell; three on the upper branch and one at the apex of the lower branch of the fifth long vein, and another at its

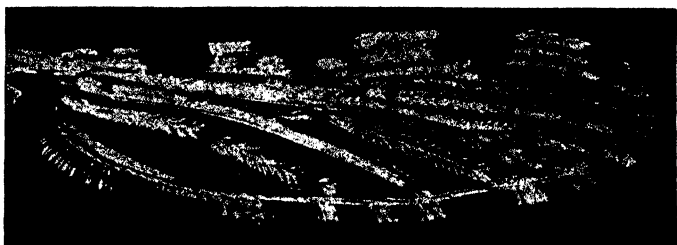


Fig. 64.

Wing of *Cellia pulcherrima* (♀).

(From the Proceedings of the Royal Society.)

base; three on the sixth; the fringe is mostly dark with seven pale patches; halteres pale ochraceous.

Length.—4·5 mm.

Habitat.—Lahore, India.

Observations.—Described from three specimens sent by Captain James, I.M.S., and Drs. Christophers and Stephens. It is a very well defined and beautiful species, closely related to *C. Kochii*, Dönitz, but quite easily separated from it by the white hind tarsi, the absence of thoracic ocelli, and by the wing ornamentation.

The ♂ is not known.

The type has been deposited in the British Museum (Nat. Hist.) collection. The name was proposed by the collectors.

CELLIA PHAROENSIS. Theobald.

Anopheles Pharoensis. Theobald.

(Mono. Culicid. I., p. 169. 1901.)

(Plates I. and VIII.)

Additional localities.—Gambia (Dr. Burdett); Egypt, from Rosaires on the Blue Nile (Dr. Keatinge, collected by W. L. S. Loat).

Note.—A photo of the wing is given on Plate I.

CELLIA SQUAMOSA. Theobald.

Anopheles squamosus. Theobald.

(Mono. Culicid. I., p. 167. 1901.)

Additional localities.—Pretoria (Dr. Theiler); Uganda (Low).

Time of capture.—February.

Observations.—Dr. Theiler sends a single specimen (a ♀) of this species. It differs slightly from the Mashonaland specimens in having all the femora with white spots, and in that the white costal spots spread more evenly on to the first long vein, and that there is an extra white spot on the first long vein under the second large black costal spot. The three pale pleural stripes cannot be seen, probably owing to the specimen being damaged.

CELLIA KOCHII. Dönitz.

Anopheles Kochii. Dönitz.

(Mono. Culicid. I., p. 174.)

Additional locality.—Perak (Dr. Wright).

CELLIA ARGYROTARSIS. Robineau-Desvoidy.

Anopheles argyrotarsis. Robineau-Desvoidy.

The following note is sent by Dr. Low :—"It appears to be rarer than *albipes*, breeding-grounds similar. Sometimes all bred from larvae turn out to be this example, and sometimes, on the other hand, *albipes*. In other instances mixtures are got. In British Guiana, at Rockstone, on the Essequibo River, eight examples caught in a mosquito net in the evening were all *argyrotarsis*. One example caught in the Barima River, about 70 miles up from the coast, was also the same. Its habits are similar to *albipes*. It can act as a host for *Filaria nocturna* (Vincent). It is inefficient for *Filaria demarquaii*."

Additional localities.—St. Vincent (Dr. Low); Dominica (Dr. Low); Para (Dr. Durham); Trinidad (Dr. Hewlett). The British Guiana specimens were taken on the Demerara and Essequibo Rivers; the Trinidad specimens partly in houses.

CELLIA ALBIPES. Theobald.

Sub-sp. *albipes*. Theobald (1901).

(Mono. Culicid. I., p. 125, 1901.)

(Plate VII.)

The characters separating this from the former are so constant that I think it is probably a distinct species.

Additional localities.—Dominica, St. Lucia, St. Vincent, Grenada, Carriacore (one of the Grenadine Islands), Trinidad, British Guiana (Dr. Low); Para (Dr. Durham).

The British Guiana specimens were bred from larvae taken in Georgetown and hatched in July; the Dominica specimens were bred from larvae and hatched in April; the Trinidad specimens were taken at Chaguanas and Cunupia.

The following notes have been sent:—

Note re biting.—Dr. St. George Gray writes that, "*Anopheles albipes* when disturbed will bite at any time of the day or night. This would help to explain the outbreaks of malaria when fresh ground is broken, etc."

Dr. Low sends the following interesting account of this species:—"Breeding-grounds, extremely varied. I have found them in rivers (Dominica), large swamps, small swamps, irrigated

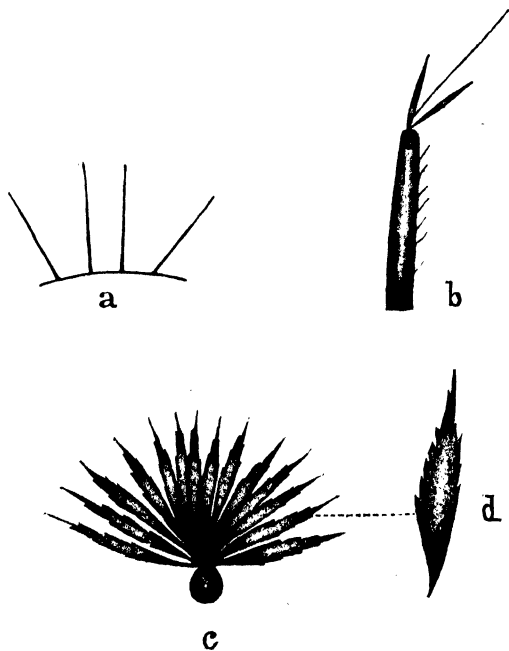


Fig 65.

Larval characters of *Nyssorhynchus albipes*. Theobald.

a, Frontal hairs; b, antenna; c, palmate hairs; d, enlarged leaflet of same (5 pairs of c).

cane fields, ditches, trenches, canals, small water courses, small water holes, depressions made by the hoofs of smaller cattle and other similar places, also in brackish water, and in a lagoon of water shut off from the sea by a bank of sand only ten yards

wide; the interesting point about the latter was that there was no vegetation of any sort in the water except some old seaweed. Any collection of water in the country seems to do for their breeding in, especially when it is more or less thickly grown with algae and other water plants. On the Morne, in St. Lucia, they were found by Major Will in large numbers in holes caused by the removal of boulders, and as these were quite recent some had no vegetable growths in them at all. In Georgetown, Demerara, I found them in great numbers in the large canals that run along the middle of many of the streets. In Dominica their breeding-grounds were very interesting. Dr. Nicholls on my arrival there told me that there were cases of malarial fever at one part of the town, and on searching this area the larvae were found in the Roseau River, in a backwater with a gentle flow of water through it. They were at the side of this in some short grass and were found to within a yard of the main current. I have never found them in water-barrels, tubs, tanks, wells, or other collections of a similar nature in towns. They are not found in Barbados, though water taken from a swamp there acted as a suitable medium for their development in St. Vincent ('Brit. Med. Journ.' Jan. 25.02). The highest altitude they were found at was on the Morne, St. Lucia, 800 feet high.

"The larvae die quickly under artificial cultivation if the water is allowed to become foul. This stage lasts fifteen to eighteen days and the pupal stage two days.

"The adult insect is not in any sense of the term a domestic or house mosquito. They come in to feed just as it is getting dark and leave again in the mornings as it gets light. Searching many native huts by day invariably gave negative results. That they do come in at nights to feed can easily be demonstrated by the use of a faulty mosquito net; being unable to find their way out again they can be collected in the morning. They are rarely seen during the day and never in bright sunlight. Imprisoned in test tubes, however, they will readily bite men or animals at any time of the day. Sitting once under a large mango tree in some thick bush at a place called Welldad, on the coast of British Guiana, about midday, large numbers appeared and bit one with great rapidity and severity. It is efficient as an intermediate host for the development of *Filaria nocturna*, but is inefficient for *F. demarquaii*. It also acts as the intermediate host for the

parasite of malignant malaria (Malaria in St. Lucia, West Indies, 'Brit. Med. Journ.' 25.1.02)."

It is difficult to keep them alive in captivity though fed on blood.

The larvae have four simple frontal hairs, the antennae with two lanceolate terminal processes and a median bristle and spines down one side. The palmate hairs (d) are jagged at the sides.

GENUS 10. **ALDRICHIA**. nov. gen.

(*Vide* Appendix.)

SUB-FAMILY **MEGARHININA**.

GENUS 11. **MEGARHINUS**. Robineau-Desvoidy.

(Mono. Culicid. I., p. 215. 1901.)

This genus has been considerably reduced in size by taking out a number of species in which the ♀ palpi are comparatively short, and which come therefore in the genus *Toxorhynchites*. Probably a number of others will have to be excluded from *Megarhinus*; but until good specimens are obtained it is not possible to say, as I cannot yet detect any difference except in the ♀ palpi, which when broken in *Megarhinus* look very like those of *Toxorhynchites*. Probably Walker's *M. inornatus* will have to be excluded.

MEGARHINUS (?**TOXORHYNCHITES**) **GRANDIOSUS**. Williston.

(Biol. Centr. Amer., Dipt., p. 224.)

"♀. Antennae brown. Proboscis black. Palpi black, covered with black and violet tomentum. Face somewhat reddish. Occiput black above and covered with green and yellow tomentum. Thorax deep red, the ground colour of the mesonotum mostly concealed beneath a metallic-green tomentum, that of the pleurae mostly silvery or yellowish-white. Abdomen brown or yellowish brown, the dorsum concealed beneath green tomentum, like that of the mesonotum. Legs yellow; dorsal

surface of the femora blackish, with green and violet tomentum ; base and extreme tip of the hind tibiae brown, the remaining portion with yellow hair ; dorsal surface of front tibiae blackish, with violet tomentum ; front metatarsi, except the tip, blackish, remainder of front tarsi light yellow ; hind tarsi blackish, the tip of the third joint and the fourth and fifth wholly white ; inner side of the hind metatarsi yellow. Wings tinged with yellowish, the scales dark brown.

"*Length*.—10 mm., with proboscis 18–20 mm.

"*Habitat*.—Mexico, Omilteme in Guerrero, 8000 feet (H. H. Smith). Distinguished from *T. rutila* by the colour of the legs."

MEGARHINUS SEPARATUS. Arribalzaga.

(Mono. Culicid. I., p. 219, 1901.)

Additional localities.—Para, Brazil (Prof. Goeldi). Taken in May. Manaos, on the Amazon (Lütz).

Notes.—The Amazon specimens were bred from larvae found in a water bucket with two larvae of *Jobbia* upon which they fed. The pupal stage lasts eight days. They are called "carapana" and bite very badly in the day-time and at night.

MEGARHINUS HAEMORRHOIDALIS. Fabricius.

(Mono. Culicid. I., p. 222, 1901.)

A specimen received from Tapezos (54.18 on label) shows the abdomen as follows : Base metallic green, changing into dark green, then purple and then coppery red ; on the fifth purplish-blue segment are a few white scales on the basal median portion ; there are also apical white lateral spots to some of the segments.

Additional localities.—Mexico, Atoyac, in Vera Cruz (H. H. Smith) ; Guiana, Cayenne (Fabricius) ; Cuba (Osten-Sacken).

MEGARHINUS TRICHOPYGUS. Wiedemann.

Culex trichopygus. Wiedemann.

(Auss. Zweiflug. Ins., p. 4 ; Mono. Culicid. I., p. 243, 1901.)

The original description only was given in Vol. I. of this work. Two specimens obtained for the Museum recently are here re-described.

Thorax black with golden green scales and bright blue prothoracic lobes; pleurae brown with white scales; abdomen steel blue and purple, greenish at the base in the ♀, caudal tuft distinct bronzy-black; legs unbanded, silvery beneath basally.

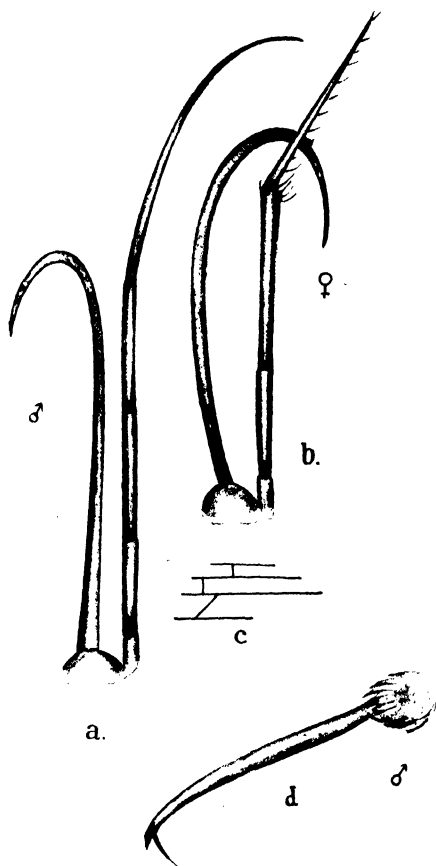


Fig. 66.

Megarhinus trichopygus. Wiedemann.

a, ♂ palp and proboscis; b, ♀ palp and proboscis; c, cross veins of ♀; d, ♂ genitalia.

♀. Head black (denuded), with traces of flat apple-green scales; antennae brown; palpi yellowish, when denuded covered with metallic purple and blue scales and a few golden ones

towards the base ; the last two joints of nearly equal length, the second joint a little more than half the length of the third, the apical joint is bristly ventrally and so is the apex of the penultimate joint ; clypeus with grey sheen ; proboscis metallic purple, with golden scales scattered over the basal portion, much curved ; in certain lights the apices of the palpal joints are mauve and the basal joints of the antennae grey.

Thorax black (much denuded), showing traces of flat apple-green, violet and blue scales, the prothoracic lobes being covered with azure blue scales ; pleurae brown with white scales ; scutellum deep brown, with flat apple-green scales ; metanotum deep brown.

Abdomen brilliant metallic blue, the basal segment green, and also the base of the second segment, each segment with basal lateral silvery spots ; the caudal tuft is composed of bronzy-brown scales only ; venter with silvery white and blue metallic scales.

Legs apparently all unbanded (the specimen under description has the legs imperfect), violet and purple scaled, the ventral surface of the femora yellowish-white.

Wings brownish, the first sub-marginal cell very small, only about half the size of the second posterior ; the mid cross-vein small, much nearer the base of the wing than the supernumerary ; the posterior cross vein about twice as long as the mid, sloping towards the base of the wing and situated a little nearer the apex of the wing. Halteres yellowish-brown. On the costal border the wings have a purplish hue.

Length.—8 mm.

♂. Head and thorax coloured as in the ♀ ; palpi yellowish, with brown scales showing violet reflections, the apices of the joints mauve in some lights, the apical joint as long as the two preceding, which are of equal length ; the second joint not quite as long as the third ; clypeus frosty grey, also basal joint of antennae ; antennae brown, joints thick, except the two long apical ones, which are narrow ; plumes brown, the second joint equal to about two of the following, densely scaled ; proboscis metallic purple and bronze.

Abdomen metallic purple above, the black caudal tuft large ; genitalia deep brown above, with long hair-like scales on the basal lobe, violet below ; venter of abdomen metallic blue, with white lateral patches ; the claspers are long and thin and end in

a laterally placed brown joint (fig. 66, d). Legs unbanded, pale ventrally.

Length.—8.5 mm.

Habitat.—Brazil (Wiedemann); Santa Catharina, Brazil (Crowley bequest, 1901, 78, ♂ and ♀).

Observations.—Redescribed from a ♂ and ♀ from the Crowley collection. They are the only specimens I have seen of this very distinct *Megarhinus*. The black or bronzy caudal tuft should at once separate it from all known species of the genus.

MEGARHINUS VIOLACEUS. Hoffmanseg.

Culex violacea. Hoffmanseg.

Megarhinus purpureus. Theobald.

(Dipt. Exot., p. 7, Wiedemann; Mono. Culicid. I., p. 230, 1901, Theobald.)

Additional localities.—Sao Paulo, Santos, Rio de Janeiro, Brazil (Dr. Lutz); Bahia (Wiedemann).

Synonymy.—The short description of Hoffmanseg's *Culex violacea* applies as far as it goes to the species I described as *purpureus*. Wiedemann gives the characters as follows: "Steel-coloured, with fuscous thorax; sides of the abdomen golden-yellow; tarsi without any white markings." The specimens I have seen show white on the venter of the mid tarsi, but if specimens are carded this would easily be overlooked. No mention is made of a caudal tuft, which is absent in the specimens I have seen. Giles* says, "caudal tufts yellow and black"; this is quite wrong, and is probably an assumption.

Dr. Lutz first pointed out to me that *Culex violacea* and my *Megarhinus purpureus* are probably the same, and as the short description applies so nearly to that species I have decided to sink my species as a synonym.

A ♀ bred by Dr. Lutz from Sao Paulo has the second pair of tarsi unbanded, as in the specimen sent previously, but broken in the post.

Larva.—Dr. Lutz has found the larva of this species in Bromelias. The pupal stage lasts about eight days.

* Handbk. Mosq., 2nd ed., p. 278.

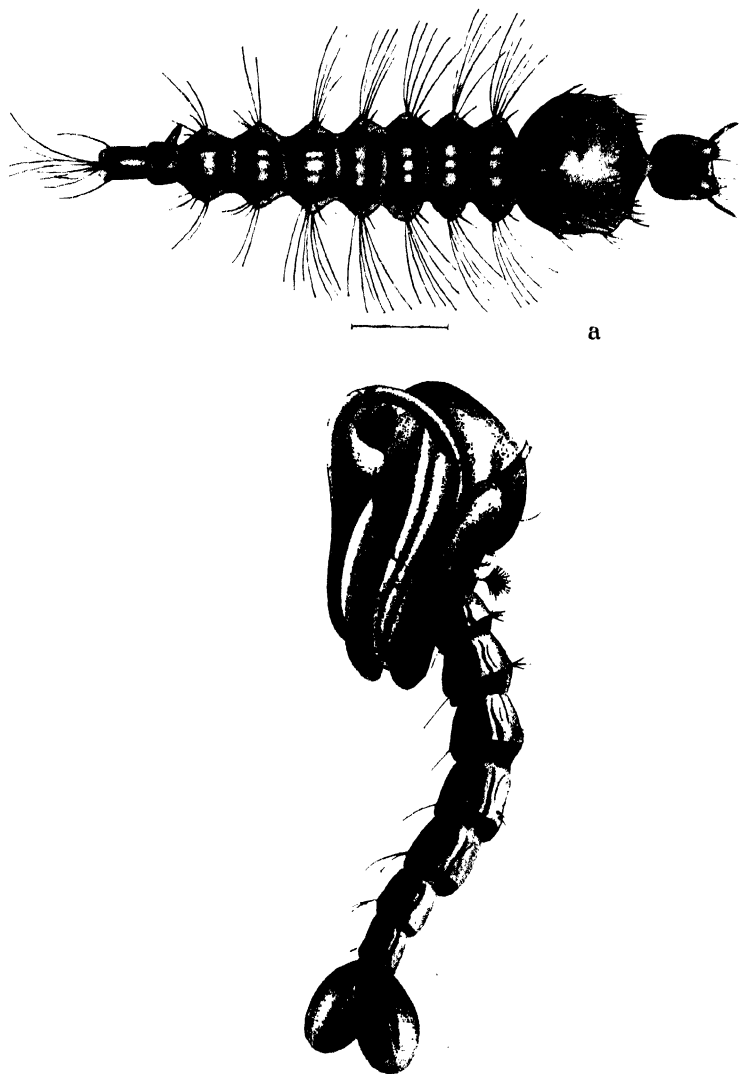


Fig. 67.

Larva (a) and pupa (b) of *Toxorhynchites immisericors*. Walker.

MEGARHINUS PORTORICENSIS. Von Roder.

(Mono. Culicid. I., p. 232, 1901.)

Two ♀'s, and larvae and pupae of this species, have been received from Dr. N. S. Durrant, the imagines bred by him from the larvae taken in Grenada, West Indies.

One ♀ is in perfect condition and differs slightly from the specimen described in Vol. I.; the other specimen is spoilt by some fluid it has been in.

The perfect specimens show none of the azure-blue scales referred to in the specimen previously described, the thoracic scales all being bright bronzy-green, especially marked at the sides of the mesothorax, and the pleural spots are creamy, not silvery white. There are no traces of caudal tufts.

GENUS 12. **TOXORHYNCHITES.** Theobald.

(Mono. Culicid. I., p. 244, 1901.)

This genus has proved a staple one and has been augmented by the incorporation of several species previously placed in the genus *Megarhinus*.

The Larva and Pupa of Toxorhynchites.

There seems to be but slight differences between the larvae of the two allied genera of *Megarhininae*. There do not seem to be any anal fins in the larvae, but the terminal segment ends in four or more swollen, knob-like processes (fig. 68, f). On the thorax are thick serrated spines (c), and the abdomen is provided with rather dense lateral tufts of bristles on the first five segments. The siphon is rather short, and terminates in a four-rayed process (c and e¹); on its ventral surface are two tufts of bristles. The head (a) is much smaller than the thorax and is provided with large serrated mandibles (b).

The pupa (fig. 67, b) has curved respiratory siphons and two prominent oval anal fins; on the dorsum of the first segment a marked upright tuft of hairs.

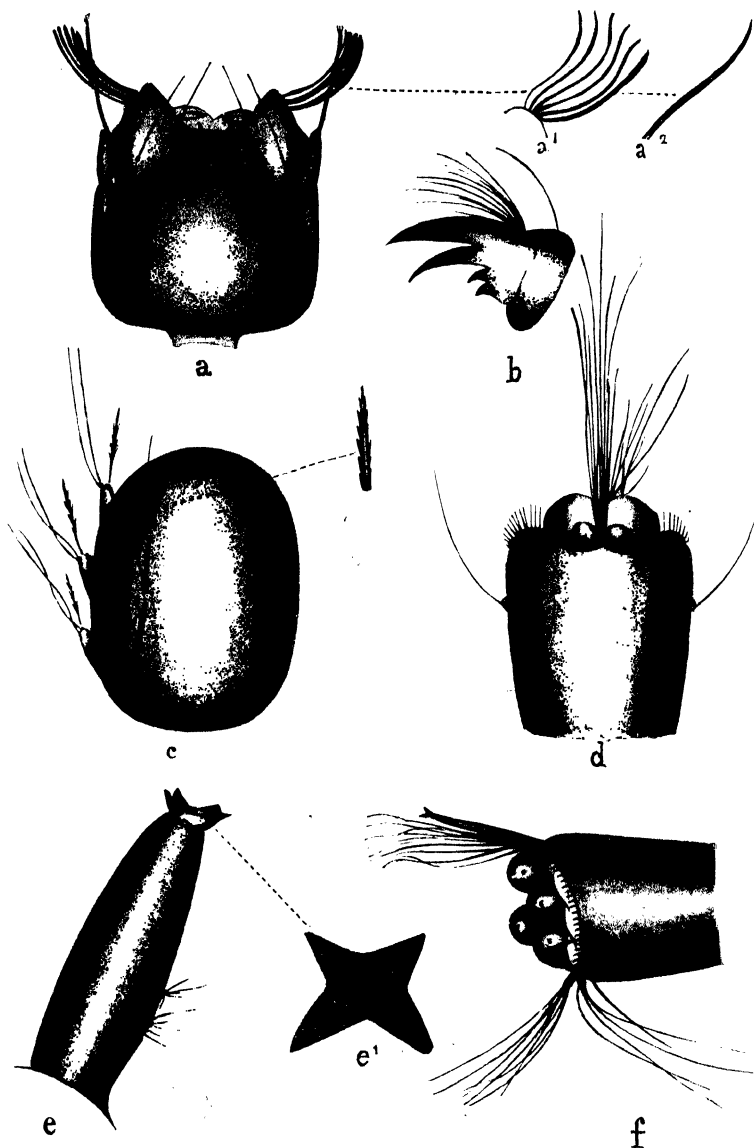


Fig. 68.

Larva of *Toxorhynchites speciosus*. Skuse.

a, Head with the brush (a¹), and a lamella further enlarged (a²); b, mandible;
 c, thorax; d, dorsal, and f, lateral views of tail; e and e¹, respiratory siphon.

TOXORHYNCHITES MARSHALLII. n. sp.

Thorax dark brown, with small bronzy and brown scales above, purplish at the sides behind and paler at the sides in front; pleurae bright silvery white; abdomen basally metallic blue, violet apically, with caudal tuft of black and orange; preceding segment with apical white tufts; legs brown, with metallic reflections, hind legs with a broad distinct basal white band to the first tarsal; metatarsal white at the base beneath.

♂. Head covered with almost black flat scales, a few azure blue ones round the eye borders, most prominent just between the eyes; four large black bristles projecting between the eyes

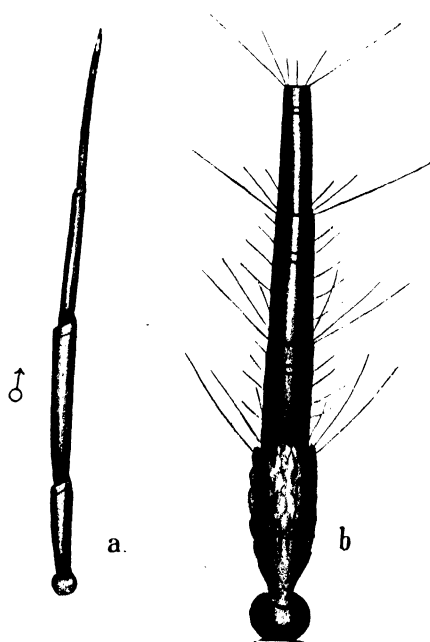


Fig. 69.

Toxorhynchites Marshallii. n. sp.

a, ♂ palp; b, base of antenna.

in front; eyes dark; antennae rich brown, with narrow pale bands, basal joint black, second joint with black scales rather longer than the next, deep brown verticillate hairs, smaller hairs of paler hue below; palpi almost black, with metallic reflections,

the apices of the antepenultimate and preceding joints mauve, the latter with silvery white apical scales as well, the last three joints nearly equal ; proboscis deep black.

Mesothorax deep rich brown, with narrow curved paler dull-brown scales in the middle, bronzy-brown in some lights ; the scales become broader at the sides, where they form a blue and mauve line, which at the front of the mesothorax becomes white ; beneath the blue line and the silvery pleurae the thorax is dark brown ; over the roots of the wings are numerous long brown bristles and flat green and metallic scales, posterior part with flat green, mauve, and coppery scales, also the scutellum ; posterior border-bristles of the scutellum rich brown, longer on the lateral lobes than on the median ; metanotum deep brown ; pleurae dark brown, with two large confluent snowy white patches.

Abdomen with the basal segment pale green centrally, white laterally ; the next two segments bright blue, the following violet and purple, the apical one with some brilliant coppery scales and the penultimate more brilliant violet than the rest ; there is an apical lateral white tuft of hairs on the antepenultimate, a black tuft along each side of the penultimate and orange hairs on the apical one, forming a distinct caudal tuft, like *T. immisericors* (Walker) ; there are also white lateral patches most prominent on the basal segments.

Legs damaged, the hind pair alone being perfect ; to the naked eye they are black, with a prominent white band on the base of the first tarsal joint ; under the lens they show metallic violet reflections, and the under side of the base of the hind metatarsi is also white ; hind ungues equal and simple ; femora and tibiae of fore legs deep brown, with metallic reflections ; remainder of the legs absent.

Wings with testaceous brown veins and slightly tinged with brown along the costal borders ; scales brown ; supernumerary cross-vein nearly four times its own length nearer the apex of the wing than the mid cross-vein ; the mid rather more than its own length nearer the apex than the posterior cross-vein ; the latter long, sloping towards the base of the wing, about four times the length of the mid ; first sub-marginal cell very small, about half the length of the second posterior cell ; halteres small, brown.

Length.—9 mm.

Habitat.—Salisbury, Mashonaland, at 5000 feet (G. A. K. Marshall).

Time of capture.—April.

Observations.—Described from a single ♂ caught by Mr. Marshall and named after him. The fore legs are damaged and the mid entirely absent, otherwise the specimen is perfect. It is very near Walker's *Toxorhynchites immisericors*, but can be told by the different lateral pale spots; in this species they are long, forming almost a lateral line on the first few segments; the white lateral patches to the first abdominal segment also readily separate it.

The ♀ is unknown. Another specimen is in the Hope Collection, Oxford. It may be a *Megarhinus*, but it is not possible to say without seeing a ♀.*

TOXORHYNCHITES IMMISERICORS. Walker.

Megarhinus immisericors. Walker.

Culex regius. Thwaites.

Megarhinus Gilesii, ♀. Theobald.

Megarhinus subulifer. Dolleschall.

(Mono. Culicid. I., p. 225, 1901 (*immisericors*), p. 227 (*Gilesii*); Proc. Roy. Soc., vol. lxxix., p. 361; Nat. Tijdschr. v. Ned. Ind., vol. xiv., p. 382 (*subulifer*).)

Synonymy.—As mentioned in my previous volume of plates (Pl. IX.), this is a true *Toxorhynchites* and not a *Megarhinus*. I have seen a specimen from the East Indies of this species, and I feel sure that Dolleschall's species, *M. subulifer*,† is the same. My *M. Gilesii*, which I described from old, faded material, must also sink as a synonym, for it is no other than a ♀ *immisericors*. The species seems to be one of the commonest members of the genus, being found from Ceylon, over most parts of India, down the Malay Peninsula, and in the East Indian Islands. There is some considerable variation in the leg-banding and also in color.

Additional localities.—Burma; Amboina.

Mr. E. Ernest Green writes me from Ceylon that he has discovered the larva of *immisericors* and has bred it up from the egg. It is, he says, a most interesting creature, purely carnivorous. It lives in hollow stumps of the giant bamboo and preys solely upon the larvae of other mosquitoes. The eggs are laid singly. They are of a regular ovoid shape and float on their sides on the water, rupturing across the equator into two equal halves to liberate the young larvæ.

* A ♀ has now been received from Uganda. It is a true *Toxorhynchites*.

† Nat. Tijd. v. Ned. Ind. xiv., p. 382.

TOXORHYNCHITES SPECIOSUS. Skuse.

Megarhinus speciosus. Skuse.

(Mono. Culicid. I., p. 228, 1901.)

This is a *Toxorhynchites* and not a true *Megarhinus*. Specimens recently received from Dr. Bancroft in fresh condition show the ♀ palpi to be short.

The larva has been found by Dr. Bancroft in a fresh-water butt at a house; when alive it is red in colour.

TOXORHYNCHITES RUTILUS. Coquillett.

Megarhinus rutilus. Coquillett.

(Mono. Culicid. I., p. 244, 1901.)

Dr. Coquillett has written me since the issue of the monograph as follows: "At the time of describing the species I supposed that the palpi of the ♀ were broken, as at that time no form with short palpi was known. The species is evidently a *Toxorhynchites*, as you surmised it might be." *

SUB-FAMILY CULICINA.

GENUS 31. JANTHINOSOMA. Arribalzaga.

(Mono. Culicid. I., p. 253, 1901.)

No new notes need be added to the characters of this genus. A single new species has been found since the publication of the first volume. The larva and pupa have been discovered, however, and an account is here reproduced.

LIFE-HISTORY OF *Janthinosoma musica*.

In a paper by H. A. Morgan† a short account is given of the life-history of this mosquito, the notes being made by Dr. Duprée.

* Since in final proof Dr. Coquillett writes me this is a true *Megarhinus*.

† Observations up the Mosquito, *Conchyliastes musicus*. Proc. 14th Annual Meeting of Asso. Econ. Ento., Bull. 37 (New Series), Div. Ent., U.S.A. Depart. of Agriculture, 1902. The name *Conchyliastes* was used by me as a MS. name only.—F. V. T.

One female deposited forty eggs on the 1st of May, some at the bottom of the glass containing the water, while others were resting upon some fibres of cotton which had accidentally fallen into the vessel. Dr. Duprée thinks it altogether likely that the eggs, which are deposited singly under normal conditions, rest upon floating *débris*.

The eggs somewhat resemble in shape those of *Stegomyia fasciata*, though larger. Short spines pointing towards the so-called head of the egg are uniformly distributed over the entire shell. The egg has a flat and a convex surface, and with the latter uppermost presents a distinctly fusiform shape. Unless *débris* floats upon the surface of the water all the eggs sink to the bottom, which accounts no doubt for the irregular periods of incubation. Of the forty eggs deposited during the night of the 30th of April, a few hatched on the 15th of May, others hatched on the 30th of May and others on the 10th of June. Thus the egg period may last from fifteen to forty days.

The larvae are active at the surface of the water for the first twenty-four hours, after which they move to the bottom when disturbed, and can remain there forty-seven minutes. They grow rapidly, one hundred and twenty hours being sufficient for their development, but the period may be extended to seven days. They move by jerks when suddenly disturbed, but usually with little motion at an angle of 45 degrees. While at the bottom they catch large bundles of *Spirogyra*, which are broken into small pieces as the surface is approached; the small pieces of food are swept into the mouth by the vortices set up by the oral cilia.

The pupae are very sensitive. Length of pupal life twenty-four hours.

JANTHINOSOMA POSTICATA. Wiedemann.

(Mono. Culicid. I., p. 253, 1901.)

A series of females has been sent me by Dr. St. George Gray with the following note: "The place where I got them (Choe) is about $3\frac{1}{2}$ miles to the north of Castries, about $\frac{1}{4}$ mile from the sea, and very slightly raised above sea-level. They attacked me while I was securing some larvæ from a culvert under the road. What I chiefly noticed about these mosquitoes was their large size and loud note and the vicious way in which they attacked me; most of those that bit on my hands were crushed in trying to capture them, for nothing would make them move once they

got their probosces into my skin. Their red colour was also very striking, and the hairs on the back and posterior part of the thorax. During life the eyes are emerald green in colour, but become darker after death."

JANTHINOSOMA MUSICA. Say.

(Mono. Culicid. I., p. 255, 1901.)

Additional localities.—British Guiana (Dr. Low) ; Para (Dr. Durham) ; Trinidad (Dr. C. H. Hewlett).

Notes.—The specimens from Trinidad were caught in a house (Hewlett) at Cedros and at Crunupia. One ♂ was very small—5 mm. in length.

Regarding the British Guiana specimens, Dr. Low writes as follows: "While proceeding to the Tapacorma Lake from Anna Regina, on the coast of British Guiana, along a water-course, with four Indians in a canoe, we left the cultivated zone and passed through some low bush,* which in places was completely arched over the channel. This made a subdued kind of light, and very quickly large numbers of this brilliant mosquito descended. They bite through one's clothes with great ease, and the bite was very painful. They were not very agile, however, and were easily caught in tubes. This was at 9 A.M. in the morning, and, strangely enough, when again re-passing this place, ten days later at 4 P.M., I only caught one specimen. This would indicate that they bite more readily in the mornings. Along with them three other species also attacked us, and all bit the Indians quite as readily as myself."

JANTHINOSOMA DISCRUCIANS. Walker.

Culex discruciens. Walker.

nec *J. discruciens*, Arribalzaga.

(Insecta Saunderiana, p. 430. Walker.)

Thorax deep brown, with bronzy brown median scales, with lateral pale creamy ones. Abdomen metallic purple, with apical

* Low bush is the term applied in British Guiana to the vegetation, really forest, that grows up on land that has once been cultivated or cleared. It is very thick and almost impossible to walk through. It is quite different in its nature to the virgin forest that one finds further up in the interior; there the undergrowth is slight, rendering progression easy. The mosquitoes in these areas as a general rule are different.

lateral silvery white spots; venter with apical silvery white bands. Legs deep metallic violet, bases of the femora pale, last two hind tarsi white.

♀. Head black, with flat spindle-shaped creamy scales in the middle; flat, violet, yellow and black scales laterally and narrow brown upright forked-scales; palpi, proboscis and antennae deep blackish-brown. Thorax black, with narrow curved black scales in the middle of the mesonotum and flat spindle-shaped creamy ones at the sides; scutellum black, with five black bristles to the mid lobe; metanotum deep brown;

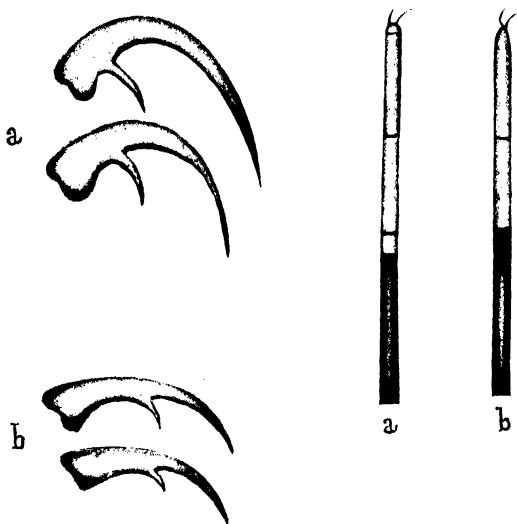


Fig. 70.

a, *Janthinosoma lutzii*. Theob.; b, *J. discrucians*. Wlk. (fore unguis of ♀ and hind tarsi).

pleurae black, with flat creamy white scales. Abdomen metallic violet, with apical lateral creamy white patches to all the segments except the last, the lateral patches most prominent on the apical segments; venter with apical bands of creamy white scales; posterior border-bristles black.

Legs unbanded, deep brown with violet reflections; coxae brown, bases of the femora pallid yellowish, last two tarsi of the hinds legs white, fore and mid unguis uniserrated. Wings rather short; first sub-marginal cell a little longer and narrower than the second posterior cell, its base nearer the base of the

wing than that of the second posterior, its stem about half the length of the cell ; stem of the second posterior nearly as long as the cell ; posterior cross-vein about its own length distant from the mid cross-vein ; halteres with pale stem and black knob.

Length.—3·8 to 4 mm.

Time of capture.—December, in Trinidad (Urich).

Habitat.—South America (Walker) ; Trinidad, at Aqua Santa (F. W. Urich).

Observations.—The types of ♂ and ♀ in the British Museum are in very bad condition ; the ♀ has no legs nor abdomen, and the specimens are much faded.

The specimens from which this description is drawn up are perfect. There is one small difference seen in the type, namely, that the posterior cross-vein is nearer to the mid than in the Trinidad specimens. The central thoracic scales are also bronzy, whilst in the specimens described here they are deep brown, but this is due to fading in the type.

Arribalzaga's *J. discruciens* is larger, being 6 mm. His species has been sent over by Dr. Lutz, and was re-named by Colonel Giles *J. Arribalzagae* ; the type, a ♀, is in the Museum. Giles is quite wrong in saying the true *discruciens* has an unadorned thorax ; the type shows it just as described here.

JANTHINOSOMA LÜTZII. Theobald.

(Mono. Culicid. I., p. 257, 1901.)

Additional localities.—Pomeroon Canal, Cara Cara Creek, Demerara River and Barima River, British Guiana (Dr. Low) ; Trinidad (F. W. Urich).

Note.—The ungues of the fore and mid legs in the ♀ (*vide* Fig. 70, a) are strongly curved and uniserrated and can thus easily be told from *J. discruciens* (Walker).

JANTHINOSOMA ARRIBALZAGAE. Giles.

Janthinosoma discruciens. Arribalzaga.

(Culicidae, Giles, p. 341, 2nd ed. ; Dipt. Argent., p. 53, Arribalzaga.)

Head with orange scales, black at sides. Thorax black, with bronzy median and orange yellow lateral scales. Abdomen violet, with golden lateral patches ; venter violet, with narrow apical golden bands, base of abdomen yellow. Legs deep brown, with

metallic reflections, base of femora honey yellow, in the hind legs the base of the *third tarsal joint* has a broad yellow band.

♀. Head brown, with flat, spindle-shaped yellow scales and dense orange upright forked scales in the middle, small flat dark scales laterally; palpi, antennae and proboscis deep brown with metallic violet reflections; palpi densely scaled; clypeus black, shiny.

Thorax black, shiny, with curved bronzy brown scales in the middle, a broad lateral band of spindle-shaped orange yellow scales; pleurae black, with dense creamy scales; scutellum black, with broad golden spindle-shaped scales and with eight black border-bristles; metanotum black. Abdomen violet, each

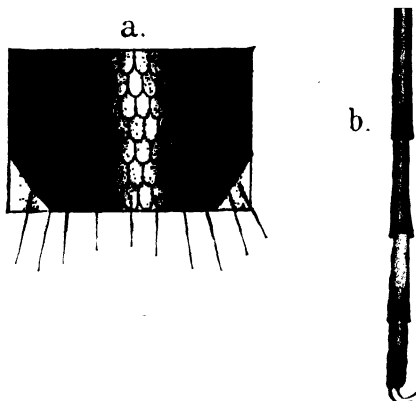


Fig. 71.

Janthinosoma Arribalzaga. (Giles.)

a, Abdominal ornamentation; b, Hind leg of ♀.

segment with lateral apical golden spots and with the basal segment yellow scaled; venter with narrow apical yellow bands to the violet segments; border-bristles numerous, black, not arising from the edge of the segments. Legs deep brown, with violet reflections, base and most of the venter of the femora golden yellow, knee spot white, in the hind legs the third tarsal has a broad basal yellow band; ungues all equal and uniserrated.

Wings with the first sub-marginal cell a little longer and much narrower than the second posterior cell, its base just a little nearer to the base of the wing, its stem a little more than half the length of the cell; stem of the second posterior as long

as the cell, the posterior cross-vein quite close to the mid; halteres with ochraceous stem and fuscous knob.

Length.—6 mm.

Habitat.—Sao Paulo (Lutz); Republica Argentina, Provinces of Bonaerensis in Las Conchas, Zarete, Baradero (Arribalzaga); Chaco, in Formosa (S. A. Holmberg).

Observations.—Originally described by Arribalzaga as Walker's *C. discruciens*; it is, however, much larger and has differently adorned legs. The band on the hind legs will at once tell it from all other *Janthinosoma*. The description is drawn up from a single ♀ taken by Dr. Lütz, now in the British Museum.

GENUS 14. **PSOROPHORA**. Robineau-Desvoidy.

(Mono. Culicid. I., p. 259, 1901.)

One new species of this genus has occurred; unfortunately I have not seen the species.

No fresh details need be added to the generic characters given in my previous volumes.

The larvae are found in a variety of places, such as "small depressions in the bed of a small stream," "hollows in small pools." Dr. Lutz has taken the larvae in bromelia water. They are strongly carnivorous, and even devour their own race.

PSOROPHORA CILIATA. Robineau-Desvoidy.

(Mono. Culicid. I., p. 261, 1901.)

Additional localities.—Pennsylvania; District of Columbia; Virginia; Connecticut; Indiana; Louisiana; Arkansas. Howard writes of this species in North America, "Rare in its northern range, and in Massachusetts and New Jersey it is found only in low-lying regions."

PSOROPHORA SCINTILLANS. Walker.

Sabethes scintillans. Walker.

(Mono. Culicid. I., p. 265, 1901.)

New locality.—Trinidad (Hewlett).

Notes.—A single ♂ and ♀ taken by Mr. Hewlett in the bush; he says it is rare in Trinidad.

The ♀ sent over is quite perfect and fresh, and shows beautiful metallic blue, violet, and green tints. They evidently fade to brown, as seen in some of the old specimens in the Museum.

PSOROPHORA HOWARDII. Coquillett.

(Canadian Entomologist, p. 258, 1902.)

The following is Coquillett's original description :—

♂. Head black, upper half of occiput covered with appressed white scales, except a narrow median stripe, hairs black; first joint of antennae yellow, second joint black, its extreme base yellow, the two terminal joints black, remainder of antennae alternate black and whitish, the plumosity black, changing to whitish at the tips; mouth-parts black, base of third joint of palpi yellow, palpi covered with violet-purple appressed scales, the last joint narrower than the preceding, tapering to the apex, its hairs sparse and very short, the penultimate joint and apical fifth of the preceding bearing many rather long hairs; body black, the humeri yellow, pleurae and sides of mesonotum bearing many appressed white scales, abdomen on upper side covered with appressed violet-purple scales, those on the first segment and a few at the hind angles of some of the other segments white; wings hyaline, first basal cell much longer than the second, petiole of first sub-marginal cell sub-equal in length to the cell; femora yellow, the apices black and on the under side fringed with rather long, narrow, nearly erect scales, remainder of femora thinly covered with appressed violaceous scales, front and middle tibiae yellow, their apices brown, thinly covered with appressed violaceous scales; hind tibiae brown, the extreme bases yellow, covered with appressed violet-purple scales interspersed with many sub-erect brown ones; tarsi brown, the first joint, except its apex and the base of the second, yellow; claws of front and middle tarsi very unequal in size, the anterior claw of each pair bearing teeth, the other with a single tooth; claws of hind tarsi of an equal size, each one-toothed; halteres yellow, becoming brown at the apex.

♀. Differs from the ♂ as follows: antennae dark brown, the first joint and base of the second yellow, the hairs dark brown, palpi dark brown, basal third yellow, bearing a few rather long hairs; hind tibiae yellow, the apices brown, tarsal claws equal, each one-toothed.

Length.—6 mm. (excluding proboscis).

Habitat.—Hartsville, South Carolina. Three ♂'s and one ♀ received from Dr. W. C. Coker, of the Johns Hopkins University. Type No. 5793. U.S. National Museum.

GENUS 15. **MUCIDUS.** Theobald.

(Mono. Culicid. I., p. 268, 1901.)

No new species have occurred in this genus, but the larvae and pupae have been found in Australia and are decidedly characteristic. The species observed is *M. alternans*.

The Larva of Mucidus.

When young, the larvae have a very large head and are ornamented as shown in the figures. The chief peculiarity is seen



Fig. 72.

Head of the adult larva of *Mucidus alternans*. Westwood.

e, f, g, Mandibular teeth.

in front of the head, where are situated (on the clypeus) two flame-like projections (fig. 73, I, b). The antennae (a) are long

and bear thick spines apically and a lateral inward tuft; there is also a prominent tuft of chaetae near their base (c). The mandibles (fig. 72, e) are serrated and powerful, having one large and three smaller teeth and two accessory pieces (f and g). The thorax is smaller than the head, and has six median anterior chaetae in two groups and six lateral (three on each side) in line with the median ones, but further apart; on the sides are two pairs of prominent projections, each provided with long chaetae.

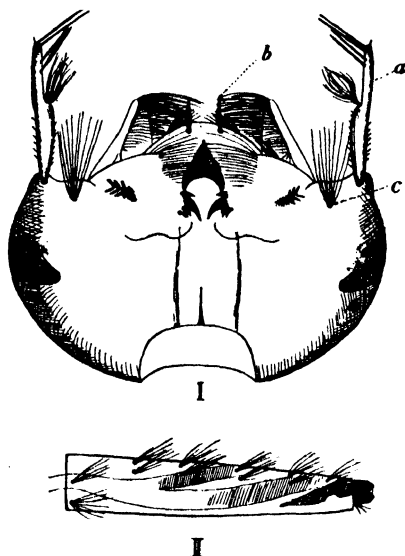


Fig. 73.

Mucidus alternans. Westwood.

- I. Head of young larva: a, antennae; b, characteristic frontal projections; c, lateral tufts. II. Respiratory siphon of larva.

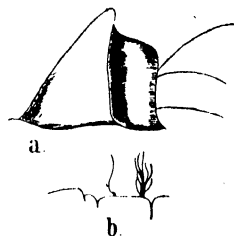


Fig. 74.

Mucidus alternans. Westwood.

- Pupa: a, Respiratory siphon; b, first abdominal segment.

The abdomen has also paired bristles; the siphon is long and thick, ending in two (?) flaps; on its lower side are rows of small bristles in pairs.

The pupa, with curious short and broad trumpets (fig. 74, a). No caudal fins; on the first abdominal segment a single bristle in front and a large plumose one behind (fig. 74, b).

The larvae are preyed upon by *Megarhinus*, one specimen sent me of the latter having eaten all the *Mucidus*, except the head, which was sticking out of its mouth.

MUCIDUS ALTERNANS. Westwood.

(Mono. Culicid. I., p. 269, 1901.)

Additional locality.—Brisbane, New South Wales (Froggatt), December.

Notes on the larvae and pupae.—The larvae live in both salt and fresh water.

A series were bred from larvae both found in fresh and salt water in February. Some of the specimens are much darker than others, the leg banding being almost black in some. It is evidently a common Queensland insect, especially along the littoral.

MUCIDUS AFRICANUS. Theobald.

(Mono. Culicid. I., p. 274, 1901.)

Additional localities.—Uganda (Dr. Moffat, per Dr. Daniels), 1 ♀ ; Nigeria, West Africa, 5.8.99 (Dr. H. A. Hanley).

GENUS 16. DESVOIDEA. Blanchard.**ARMIGERES.** Theobald, 1901.(Mono. Culicid. I., p. 322, 1901, *Armigeres*.)

The name I gave this genus had been previously used. Blanchard then proposed the one given above.

The larvae and pupae have been sent me by Dr. Durham, and are here described. A single new species is also added.

The Larva and Pupa of Desvoidea.

The larvae (Plate XVII.) are called "flap-tails" by Dr. Durham. They are deep grey to bright reddish-brown in hue, with bright brown head with darker markings, especially a black line at the back of the head, and simple tubular antennae, abruptly truncated with a small blunt terminal joint and a lateral spine; the thorax is broader than the head and has four lateral tufts of black hairs, in two pairs, the larger uppermost and arising from a brown conical papilla, the lower smaller one arising direct from the skin over the first big lateral tuft, a smaller tuft on each side, and a few in front of the first lateral branch; the first two abdominal segments have branched lateral tufts, the next three a pair of black lateral bristles, the third to fifth a pair of dorsal

ones on each side ; the 6th and 7th have no bristles, the eighth a single lateral pair ; the siphon is short and brown, with a row of spines near its base, four elongated oval pale "flap-tails" ; a patch of long brown hairs (dorsally placed) on the flaps, and a small ventral fan, and a small fan-shaped lateral bunch on each side between the siphon and the last segment.

Length.—8 mm.

The *pupae*, Dr. Durham says, are at first pale ochraceous and later deep intense black. The siphons (fig. 76, a) are short and broad, and end as shown in the figure. The anal plates have a fringe of long hairs and the first abdominal segment a distinct plumose tuft composed of several plumose bristles.

The larvae from which this description was drawn up were taken by Dr. Durham in a stable catch-pit, very foul.

They hang almost head downwards, according to Dr. Durham's rough sketch sent me.

DESVOIDEA FUSCA. n. sp.

Head black, with white border to the eyes and a white median patch. Thorax deep brown, with rich brown scales and pale side line ; pleurae with white patches. Abdomen coal-black, with white lateral basal spots, not seen dorsally. Legs jet-black, no white knee spots. Wings much as in *obturbans*, but the cross-veins different. Male palpi with the apical joint markedly shorter than the penultimate.

♀. Head clothed, with flat black and white scales, the white around the eyes and in the middle, and a small patch on each side ; palpi and proboscis black, the apex of the former apparently with some white scales.

Thorax black, with narrow curved, flattish bronzy scales ; prothoracic lobes with white scales and also a few white scales laterally, especially at the base of the wing ; pleurae brown, with four prominent silvery-white patches ; scutellum brown, with small, flat, black scales and black border-bristles ; metanotum brown.

Abdomen jet-black, with basal white lateral spots, almost extending along the sides as a line ; venter mostly white scaled.

Legs with brown coxae and white scales, bases of the femora white, remainder jet-black ; hind tibiae longer than the hind metatarsi ; ungues of fore and mid legs equal and uniserrated, hind equal and simple.

Wings with the fork-cells small, very slightly longer than the

second posterior cell, also very slightly narrower, its base nearer the apex of the wing, its stem nearly equal to its length; stem of the second posterior about two-thirds the length of the cell; posterior cross-vein about its own length distant from the mid. Halteres with ochraceous stem and fuscous knob.

Length.—4 mm.



Fig. 75.

1, Mid unguis of ♂ *D. obturbans*, Walker; 2, of *D. fusca*, n. sp.; 3, ♂ palp of *D. panalectros*, Giles; 4, of *D. fusca*, n. sp.

♂. Head, thorax and abdomen as in the ♀; palpi black, similar to *D. obturbans*, but the apical joint not as long as the penultimate joint; fore unguis unequal, both uniserrated; mid more or less equal, one toothed and of usual form, the other contorted and apparently simple; posterior tibiae longer than the metatarsi.

Length.—4 mm.

Habitat.—Kuala Lumpur (Dr. Durham).

Observations.—Closely related to *obturbans* and *panalectros*, but smaller, and the ♂ has the apical palpal joint shorter than the penultimate joint; in *panalectros* the two joints are about equal; in *obturbans*, the apical slightly longer, but especially differs in having the curious mid unguis shown at fig. 75.

The larvae of this species sent by Dr. Durham were taken in a tub. It resembles very closely the larva of *panalectros*, and I have not had enough perfect material to work it out, but I could detect one constant difference, namely, in the number of spines at the base of the last segment, which are six (*vide* Plate XVII.), not ten to twelve (probably twelve always), as in *A. panalectros*.

The hair tufts on the sides of the first abdominal segments are composed of two bristles only, not several as seen in *A. panalectros*.

In length the largest larva sent was 7 mm.

The pupa has short respiratory siphons of peculiar form shown in fig. 76, a.

On the first abdominal segment is a distinct dorsal tuft, the bristles being plumose apically (fig. 76, b), the next two segments

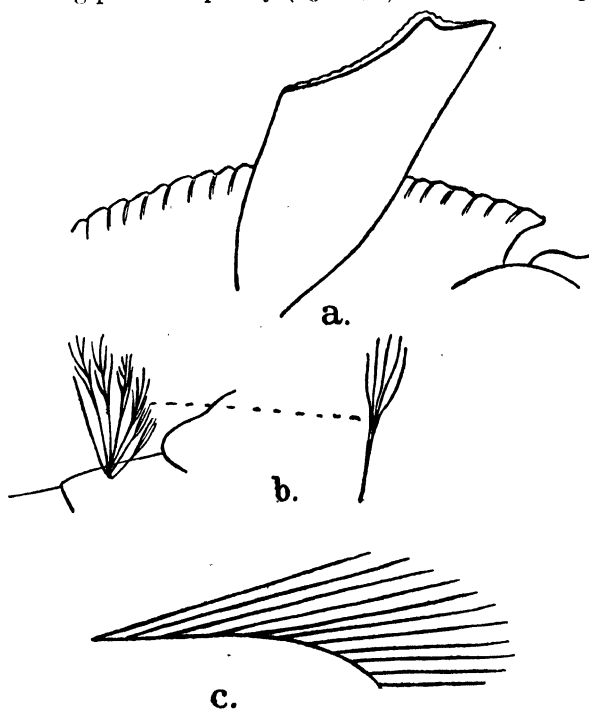


Fig. 76.

Pupa of *Desvoidea fusca*. n. sp.

a, Siphon; b, first abdominal tuft; c, edge of anal plate.

have long dorsal lateral bristles, on the three following somewhat shorter, at the sides of the sixth, seventh and eighth multi-rayed bristles, the first with three rays, the next with seven rays, the last with seven and possibly eight (one seems broken), a fourth tuft exists apically; on the sternal plates is also one (or more) tufts of bristles. The anal flaps are peculiar, being edged with long, dense cilia (c).

Length (in curved position).—4 mm.

Notes.—The larvae and pupae were sent by Dr. Durham; but in the same tube were larvae of a *Culex* and a pupa differing from the one described here; also eggs in rafts.

From the number, I fancy the pupa described here is undoubtedly that of the flap-tail larvae of this species. Whether the egg rafts are seems doubtful, so I have not attempted to describe them. The *Jungra Culicids* are certainly distinct from the larger *A. panalectros*, but the larval material was much damaged, only one larva possessing any anal flaps—the others had them broken off. The number of the spines (fig. 76c) seems characteristic.

DESVOIDEA OBTURBANS. Walker.

Culex obturbans. Walker.

Culex ventralis. Walker.

Armigeres obturbans. Theobald.

(Mono. Culicid. I., p. 323, 1901.)

Additional localities.—Perak (Dr. Wright); Shaohyiling, China (Cornford), in July.

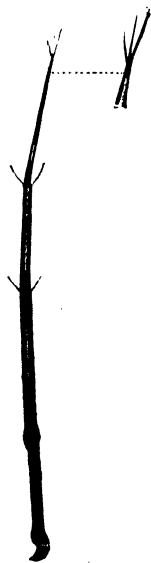


Fig. 77.

Desvoidia obturbans. Wlk.
♂ palpi.

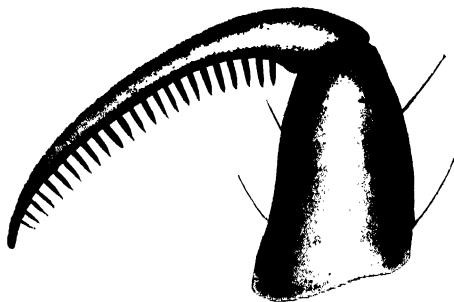


Fig. 78.

Desvoidia obturbans. Walker.
♂ clasper.

Notes.—The ♂ claspers in this species are very peculiar; the basal joint is short and broad, but the clasper is large,

strong, and carries on its inner edge a row of strong stout teeth like the spines of a comb.

The palpi were figured inaccurately in Vol. I., and another is here reproduced. There seem to be always three apical spines on the last segment, which is slightly longer than the penultimate.

DESVOIDEA PANAELECTROS. Theobald.

Armigeres panaelectros. Theobald.

(Mono. Culicid. II., p. 317, 1901, Theobald; Handbk. Gnats or Mosq., p. 286, Giles, 1902.)

Additional localities.—Perak (Dr. Wright); Calcutta (Giles).

GENUS 17. **STEGOMYIA**. Theobald.

(Mono. Culicid. I., p. 283, 1901.)

This genus has not increased much in size; but two new species are here described, one by Miss Ludlow.

STEGOMYIA NIVEA. n. sp. (Ludlow).

“♀. Head covered with dark brown scales, which in some lights give bronze iridescence, dark brown forked scales on the occiput, narrow white rim around the eyes; proboscis with dark brown scales, also showing iridescence; palpi dark brown; antennae dark brown, verticils brown, pubescence pale; eyes brown.

Thorax: the mesonotum densely covered with long curved white (silvery) scales from the neck about two-thirds of the way, with three very narrow dark lines, one median and two sub-median. The rest of the mesonotum with dark brown curved scales; scutellum covered with dark brown scales, also showing iridescence; metanotum nude; pleurae dark brown, with silvery spots.

Abdomen covered dorsally with dark brown scales, the first three segments entirely brown, the fourth showing a small basal median white spot, the following segments basally white banded, the bands heavier on the last two segments; brown and light hairs on the apex of each segment; ventrally the abdomen is

basally white banded throughout, the bands widened laterally so as to form heavy white basal lateral spots.

Legs: coxae and trochanters light, and ventral side of all the femorae light, but the rest of the legs are very dark brown (almost black), except the femorae of the hind legs, which are white dorsally, as well as ventrally, two-thirds of the distance from the trochanters to the tibiae; the tarsal joints, including the metatarsus of the hind legs, are a slightly lighter brown, and show iridescence. Ungues simple and equal.

All the flat brown scales, on whatever part of the body, show bronze iridescence; but the curved and forked ones seem to lack it. This, of course, does not apply to wing scales.

The wings show the typical *Stegomyia* scales, brown; the first sub-marginal cell is slightly narrower and longer than the second posterior, the bases being nearly on a line; the mid and supernumerary cross-veins meet, the latter a little shorter than the mid vein, and the posterior distant from the mid vein about twice the latter's length.

Length.—5·6 mm. (including proboscis).

Habitat.—Oras, Samar, Philippine Islands.

Time of capture.—May to July. (Miss Ludlow.)

Note.—A specimen of this very distinct species has been presented to the Museum by the describer.—F. V. T.

STEGOMYIA ALBOCEPHALA. n. sp.

Head covered with flat dull white scales, a small dusky patch on each side, and a posterior semicircular area of dark upright forked scales. Thorax deep brown, covered with scattered golden scales, showing more or less two dark eye-like spots; scutellum with small flat white scales. Abdomen black, with narrow basal white bands. Legs black; the hind tibiae with a marked apical white band.

♂. Head brown, covered with dull white flat scales, with a silvery sheen, and small patch of black scales on the border about the middle of the eyes, and dull black scales at the sides, posteriorly are black upright forked scales, giving the head a dark appearance of semicircular form, in front the upright forked scales are yellow. Proboscis, palpi, and antennae deep blackish-brown; palpi with a trace of a pale band on its basal half, two apical joints nearly equal, with black hair-tufts and also black hairs at the apex of the antepenultimate joint.

Thorax rich deep-brown, with scattered golden narrow-curved scales, and showing in certain lights two dark eye-like patches on the ground surface; scutellum covered with small flat shiny creamy-white scales; pleurae brown, with patches of grey scales; metanotum deep clear brown.

Abdomen brown, with basal white bands which spread out laterally; venter black, with broad basal white bands; densely clothed with long brown hairs.

Legs black, unbanded except for a clear, rather broad white apical band to the hind tibiae; coxae brown; bases and venter of the femora grey; unguis of the fore and mid legs unequal, the larger uniserrated, the smaller apparently simple(?); hind unguis rather long, curved, equal and simple.

Wings with the first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the latter, its stem not quite so long as the cell; stem of the second posterior cell as long as the cell; posterior cross-vein about half its own length distant from the mid cross-vein; halteres with yellow stem and slightly fuscous knob.

Length.—4·5 mm.

Habitat.—Gambia (Dr. Dutton).

Time of capture.—November.

Observations.—Described from a single perfect male bred by Dr. Dutton from a larva found in a canoe. This *Stegomyia* very closely resembles *Culex univittatus* (Theobald), and might readily be mistaken for it on account of the conspicuous hind tibial banding; but an examination of the head and scutellum readily reveals flat scales only. The pale head, white scutellum, and brown thorax form striking characters.

STEGOMYIA FASCIATA. Fabricius.

(Mono. Culicid. I., p. 289, 1901.)

Add to list of synonyms *Culex annulitarsis*. Macq.

New localities.—St. Kitts, Nevis, Antigua, Carriacou (Grenadine Islands), Trinidad, Barbados, Dominica, Montserrat (Low); Trinidad (Hewlett), Luzon, Philippine Islands (Sept. 7.01, Miss C. S. Ludlow); Port Darwin, South Australia; Para (Durham); Gambia (Burdett), taken in houses, McCarthy Island, in July; Victoria, Seychelles (Denman); Nigeria (Hanley); Fiji (Hewlett).

New notes, etc.—The following long note of considerable interest has been sent by Dr. Low:—"It is essentially a domestic mosquito, breeding in water barrels, tanks, wells, tubs, fountains, and other such collections round houses. It is very commonly found together with the larvae of *Culex fatigans* in the same water. I have never found it in other situations such as in the country, collections of water favoured by *Anopheles* and other mosquitoes, what may be termed wild mosquitoes, in contradistinction to the domestic. It is very common (in the West Indies), though in some islands *C. fatigans* greatly predominates (e.g. Barbados).

"The larvae can at a glance be distinguished from *Culex* larvae . . . they really have no resemblance to a typical *Culex* . . . their behaviour in water is quite different. If one looks into a barrel in which the two larvae are, one will at once notice most of the *Culex* at the surface breathing, every now and again descending to feed for short periods. The *Stegomyia* larvae, however, will be noticed wriggling about at the bottom, their movement in some ways resembling that of the blood worms. They remain here for considerable periods of time, and then slowly come up to the surface, take in fresh air, and go down again. To illustrate this, if one wants to catch them, one has to put one's ladle down to the bottom and scoop them up from there, whereas in the case of the *Culex* you can easily dip them up from the surface. Their colour is greyish-white, instead of brown, as is the case of *Culex fatigans*.

"The imago is a very irritating and annoying insect, attacking one with great pertinacity. As Gray says, it is especially troublesome between the hours of 1 P.M. and 3 P.M. Whilst in Trinidad, unless I went into bed under a mosquito net, I found it impossible to have a rest and sleep in the heat of the day owing to the continual bites of this pest. It used to bite one on the feet and ankles in the mornings when shaving, and again, as Gray says, bites all night as well. It is a very pretty little mosquito and very hardy, living in captivity on sugar and bananas for a long time. I have kept them as long as forty days, and they were quite active then. If one introduces one's hand into the cage they quickly settle on the hand and probe with their proboscis, but they never puncture, and I have never seen blood in the stomachs of hundreds I have examined. Black and blue clothes are where they especially choose to rest,

and it is really astonishing, if one has none of those hanging about, the reduction in their numbers.

"It is not an efficient intermediate host for the *Filaria nocturna*, as you state in your book (*vide* my paper in the 'Brit. Med. Journ.,' June 1. 01)."

Regarding the *egg-laying habits*, Dr. St. George Gray writes me as follows:—"There were no eggs yesterday evening or this morning at 6, 9 or 12 o'clock; but at 3.45 P.M. I found twenty-five eggs floating singly on the surface of the water. They must have been deposited in the early afternoon, at the time these mosquitoes are most attentive."

Pairing of Stegomyia.—Dr. St. George Gray writes regarding the pairing of *Stegomyia fasciata* as follows:—"I have frequently seen the pairing of *Stegomyia* in my cage. The male invariably gets under the female, who may or may not carry him off and complete the process in the air. In a cage in which I had fifty or sixty this went on all day long, the males flying from one female to another, apparently never tiring."

The Breeding of Stegomyia Fasciata in England.

Through the kindness of Dr. Finlay, to whom is due the great discovery of the connection between the "mosquito and yellow fever," I have received the ova of the "yellow fever" carrier *S. fasciata*. I did not think *Stegomyia fasciata* would live and breed here, and hence the ova sent by Dr. Finlay from Cuba were doubly welcome.

From neglect, these eggs after their journey (sent dry in a test tube) were left for two months. They were, however, as an experiment, put in some tepid water in my greenhouse, and, much to my surprise, in less than twenty-four hours they gave rise to larvae. The majority lived for ten days and then commenced to die, but six entered the pupal stage at the end of three weeks. Of these, one gave rise to a perfect female, of quite normal appearance, the others to males.

A series of this world-wide species has been sent by Dr. Bancroft from Australia, and is represented by eighteen specimens (♂'s and ♀'s), which show considerable variation. The ♀'s are notably larger than East Indian, West Indian or Asiatic specimens, but the ♂'s are no larger. They were taken in December.

Three ♀'s show very marked white apical banding to the

abdomen as well as basal, and traces of creamy scales in the middle of the segments forming more or less a median line; one has creamy scales dotted irregularly over the basal segments.

These come in variety *Bancroftii* (Theobald). They were taken at the same time and locality as the typical specimens.

Regarding this species in Australia, Dr. Bancroft writes as follows:—"So far as observed, ♀'s alone bite, diurnal in habits; breeds in water-butts, etc., near dwellings in Brisbane; the eggs are not laid in one mass, but singly on water in chains, with an interval between each egg of a quarter of an inch or more. It will live in confinement for two months or thereabouts."

Specimens sent by Dr. Hanley from Nigeria were of the variety *Queenslandensis*, both ♂'s and ♀'s being very white.

They were captured in July and August.

Both varieties *Luciensis* and *Queenslandensis* occur in the Seychelles; the former has the abdomen like the latter, but the black apical band to the hind tarsi most distinct. *Luciensis* also occurs in Trinidad.

Some Fijian specimens sent were taken in April, May and June.

STEGOMYIA SCUTELLARIS. Walker.

(Mono. Culicid. I., p. 298, 1901.)

Additional localities.—Penang (Dr. Freer); Perak (Dr. Wright); Victoria, Seychelles (Dr. R. Denman); Shaohying, China (Cornford); Canara district, Goa, India (E. H. Aitken); Christmas Island (Dr. Durham); British New Guinea.

Notes.—Mr. B. G. Corney writes from Fiji regarding this species as follows:—"Diurnal mosquito, disappearing entirely at night; taken in a wooden hut five yards from high-water line of sea coast, on sandy soil, forest adjoining and high land; locality, Island of Bega." The pleurae have the silvery-white scales arranged in three lines, more or less parallel.

The Penang specimens were taken in the Leper Hospital at Putan Jerejah. Mr. Aitken records it biting during the day in the Canara district.

The larva.—Mr. Aitken reared this species in Bombay, and says: "There is little difference between the two larvae in form or habits, in both of which they differ from *Culex* proper. The antennae are short and straight, the head not so broad as the thorax, and the breathing tube short and stout. Their position

when floating is nearly perpendicular. Their food consists largely of rotting leaves, and the rapidity with which some in my keeping reduced a leaf to a skeleton suggested that this might be one of the ways in which the beautiful skeleton leaves which one often meets with in this country are produced. The ideal breeding place for this *genus* * is a small hole, in a well or in a hollow tree, well shaded from the sun and filled with a brew of rotting leaves, the colour of beer. In Canara this can be had at any season, and I found the gloomy beds of forest streams swarming with them in March and April. They (the adults) were venomous and thirsty, and having once found me they would follow me out into the sunlight and refuse to be driven off."

Miss Ludlow informs me that a variety similar to that seen in *fasciata*, viz. *luciensis*, occurs in the Philippines. The base of the last hind tarsal has a prominent black band.

STEGOMYIA NOTOSCRIPTA. Skuse.

(Mono. Culicid. I., p. 286, 1901.)

Additional localities.—Deception Bay, Queensland ; Croydon and Cowra, in New South Wales (Froggatt).

Notes.—The two ♀'s sent by Dr. Bancroft from Deception Bay bear on the labels "Biting in jungle." "Previous to this date," writes Dr. Bancroft, "I have always found this mosquito in the neighbourhood of dwellings."

The specimens were taken in June. In both the abdominal banding is scarcely perceptible.

The specimens sent by Mr. Froggatt were captured in June and December.

The *larvae* are found in fresh water butts, about houses as a rule.

STEGOMYIA PERISKELATA. Giles.

(Handbk. Gnats, 2nd ed., p. 371, 1902.)

The following is Giles's description :—

Wings densely black-scaled. Tarsal joints with minute basal yellowish bands to all the joints, the bands being specially narrow on the hind pair. Thorax black, grounded with narrow curved golden scales, and numerous long black bristles. Abdomen dark brown, sooty behind, with

* Presumably this means species. The type of the genus *S. fasciata* breeds in tubs or anywhere, and so does *S. notoscripta*.

barely perceptible pale basal bands, and brilliant triangular snowy lateral spots. Proboscis black, with a broad snowy band.

♂. Head white, with two broad lateral bands of black, imbricated scales cutting off a large median triangular patch on the nape. Proboscis spatulate, black, with a broad snowy band beyond the middle. Palpi equalling the proboscis in length, basal joint minute, the next two very long and sub-equal, the last two also sub-equal, but very short, entirely black, except the last joint, which is snowy. Antennae quite as long as the proboscis, the hairs of its verticils exceptionally long and dense. The knee spots are barely perceptible, but each femur shows a distinct broad white garter about a quarter of the length from its tip. Pleurae with snowy spots; halteres entirely pale. Scutellum with pale brown scales; venter dark grey, with white basal spots.

Length.—4 mm.

Habitat.—Shahjahanpur, N.W.P., India, in October.

CULEX BRBVIPALPIS. Giles.

Stegomyia brevipalpis. Giles.*

(Handbk. Gnats or Mosq., 2nd ed., p. 384, 1902.)

The following is Giles's description :—

Wings unspotted, black scaled, those on the costa peculiarly long and thorn-like, especially in the male; distal veins very long and narrow. Tarsi unbanded, black. Abdomen black, not noticeably banded. Palpi of ♂ about two-thirds the length of the proboscis, uniformly fuscous.

This curious little mosquito is at once one of the smallest and blackest of the family, and closely resembles a sandfly common in the same locality. Some females show signs of lateral white abdominal spots and of an apical fringe to the segments, and there are white specks on the pleurae and coxae in both sexes. The male presents several peculiarities, the curvature of the nape consisting of a broad median area, clothed with yellow upright forked and narrow curved scales. The palpi are exceptionally short, and much resemble those of a female *Anopheles* in form; the antennae, on the other hand, are well nigh as long as the proboscis. The abdomen is very narrow in front, gradually widening to the sixth segment, resembling in this respect *C. annulatus*, Schrank. In both sexes the venter is rather pale cinereous. The fore and mid ♂ unguis are unsymmetrical, with each claw provided with a minute basal accessory tooth. Those of the hind legs are small, simple and symmetrical. In the ♀, the apices of the femora are light coloured.

Taken at Shahjahanpur, N.W.P., India, in October, in the house. The ♀ bites during the day.

The types are deposited in the British Museum collection.

* I have examined these and find they are not *Stegomyia* but typical *Culex*.

STEGOMYIA MICROPTERA. Giles.

Culex micropterus. Giles.*Wyeomyia micropterus*. Giles.

This insect, of which Giles's description is given in Vol. 2 of this work, p. 281, under the heading *Wyeomyia microptera*, is now said by Giles to be a *Stegomyia* (vide his "Handbook of Gnats," 2nd ed., p. 380).

I have not seen the specimen, which appears to have been lost. Another locality is given, namely Jhansi.

STEGOMYIA NIGRICEPHALA. Theobald.

(Mono. Culicid. II., p. 315, 1901.)

(Plate XII.)

Additional locality.—Buguma, Nigeria, West Africa (A. H. Hanley). Captured in July.

Notes.—The original description of this species was drawn up from a single specimen. I was thus unable to mount the wing, hence an error due to its uneven surface.

The description of the wing should read as follows:—First sub-marginal cell longer and narrower than the second posterior cell, its stem scarcely two-thirds the length of the cell, the base of the first sub-marginal cell nearer the base of the wing than that



Fig. 79

Wing of *Stegomyia nigricephala* (♀). n. sp.

of the second posterior; posterior cross-vein rather more than twice its own length distant from the mid cross-vein. Some fresh specimens also show some flat creamy-white scales at the sides of the head and black upright forked ones behind.

GENUS 18. **THEOBALDIA.** Neveu-Lemaire.

(Compt. Rendus. d. Seances d. la Soc. d. Biol., 29 Nov., 1902.)

(Plate X.)

Palpi long in the ♂, the two apical joints swollen, the palpi being clubbed as in ♂ *Anopheles*, three-jointed, the other three pseudo-joints not being complete, two apical joints and apex of the long joint with hair tufts; ♀ palpi distinctly five-jointed, the three basal joints small, the fourth long, and the apical one minute. Head scales moderately large. Wings with many large lanceolate scales, which become collected into patches forming more or less distinct spots.

The respiratory siphon of the larva is rather short and thick. The eggs are laid in large rafts.

These spotted winged mosquitoes form a natural group, easily distinguished in the ♂ by the clubbed antennae and in both sexes by the thick wing scales, many of a lanceolate form, and collected here and there into groups forming spots.

The following species come in this genus:—*spathipalpis* (Rondani); *glaphyroptera* (Schiner); *incidens* (Thomson); and the type species *annulata* (Meigen), with the allied *Ficallbii* (Noe).

THEOBALDIA ANNULATA. Meigen.*Culex annulatus.* Meigen.

(Mono. Culicid. I., p. 331, 1902.)

This species has been made the type of a new genus by Neveu-Lemaire. I had made *C. incidens* the type of a new genus, Professor Aldrich pointing out to me the generic importance of the wing scales. My colleague, Neveu-Lemaire, has, however, founded a genus on the palpal characters which include *incidens* and others.

The ♂ genitalia of *annulata* has the clasper simple with an asymmetrically placed terminal tooth (Fig. 80).

Additional localities.—Interlaken, Switzerland (Rev. E. A. Eaton); France generally; United States (Miss Ludlow).

Late appearance in England.—There is no doubt that this large mosquito hibernates in sheds, cellars, etc., during the winter. They are mainly noticed indoors in Kent in October, and now and then in the first week of November, but during

the past year they were active both indoors and out right through the winter. No ♂'s were seen until November 15th at Wye; they then appeared in some numbers, and were frequently found dead, probably having died after fertilizing

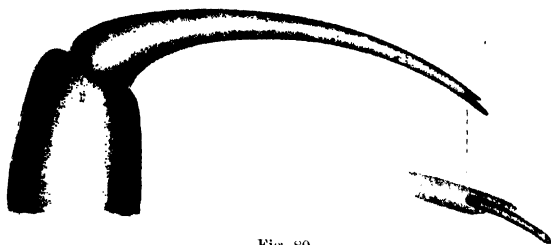


Fig. 80.
Theobaldia annulata. Meigen.
♂ genital clasper

the females. This mosquito bites very severely. The following notes sent by W. Hatchett Jackson, Esq., D.Sc., and Radcliffe Librarian of Oxford, are of special value, and are reproduced *in toto* :—

NOTES ON *THEOBALDIA ANNULATA*.

It usually occurs in the flat country round Weston-super-Mare in large numbers during September and October; but it only invades the town of Weston itself to any appreciable extent when the wind blows from the plains—that is to say, from some quarter between N.E. and S. It has been relatively rare round Weston and on the Glastonbury plain the last few years owing to the ponds and the wet dividing ditches, known in Somerset as rhines, being dry or almost dry in summer. In the autumn of the past year (1902) there has been a veritable plague; there was a sufficiency of water in the warm months and a prevalence of easterly winds in autumn. Hence few persons in Weston and its neighbourhood have escaped the attack of this gnat.

The consequences of its puncture may take one of three distinct lines :—

(1) It is followed by a simple hard swelling, which, however, rises more slowly and disappears more slowly than the swelling caused by any other gnat known to me. It is also larger, and traces of it may exist for months—*e.g.*, in my own case I still have a slight thickening now (5 Feb., 1903) due to a puncture made Nov. 8, 1903.

(2) A swelling arises as above detailed, but it is accompanied by a large reddened and puffy area of inflammation. A clear vesicle containing a yellowish lymph develops in the centre of the hard swelling. There is more or less severe itching. If opened, the vesicle drains lymph for three to four days, and the inflammatory area diminishes *pari passu*.

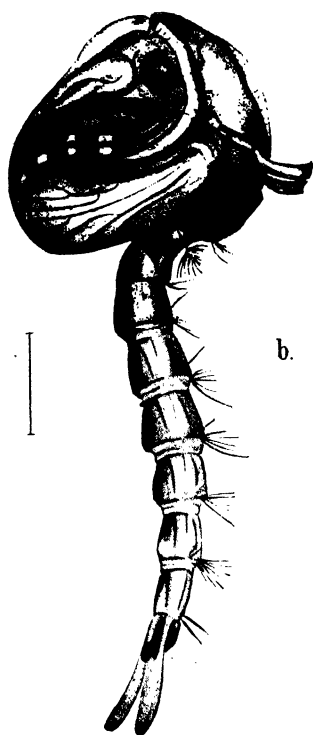
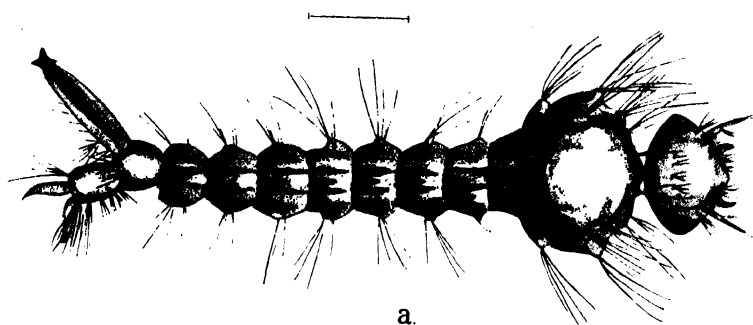


Fig. 81.

Larva (a) and pupa (b) of *Theobaldia annulata*. Meigen.

Cases have occurred, especially in women, where there have been four or five simultaneous but separate punctures, and the patient has suffered so much malaise as to retire to bed with fever ranging up to 101° F.

(3) The hard swelling is slight or absent, but there is great and extensive œdema. A case occurred in the practice of a friend of mine in which there was a puncture on the man's hand; the whole arm inflamed, and was extremely painful, with œdematous swelling extending up to the shoulder joint. Our own cook had a puncture this autumn on the forearm, and developed a regular attack of "water in the elbow joint," so that the arm became almost immovable.

This year I caught specimens of the ♀ of this species as late as Jan. 13 in a summer-house with glass windows, as well as in our own house. I saw no males after the second week in November, 1902, and at that time I noticed on a sunny day, in a warm nook of our garden, numbers of this gnat—all ♀—flying about and settling on the stems of plants and inserting their proboscides, apparently engaged in sucking. The two plants attacked were the periwinkle (*V. major*) and young wallflowers.

Most people at Weston are well acquainted with this species owing to its speckled wings, and it is usually to be met with in autumn in the woods on Worlebury Hill behind Weston on the north. Indeed, it is sometimes spoken of as the "Wood Gnat."

Larvae and pupae (Fig. 81).—The larvae are found in water-barrels, small pools, etc. They are quite large, when mature reaching nearly three-quarters of an inch in length. In colour they are pale greyish brown; the head is smaller than the thorax; the antennae with terminal spines and a tuft on the inner side; the siphon is rather short and thick. The pupa (Fig. 81, *b*) has rather curved, truncated respiratory siphons and prominent anal fins, and a very distinct tree-like tuft on the first abdominal segment. The eggs are laid in large boat-shaped masses.

THEOBALDIA INCIDENTS. Thomson.

Culex incidens. Thomson.

(Eugen. Resa. Dipt., p. 443.)

(Plate X.)

Thorax deep brown, bright ferruginous in the middle, with narrow-curved pale golden yellow scales forming irregular ornamentation; scutellum with three patches of narrow-curved creamy scales; pleurae brown, with white scales. Abdomen deep brown, with narrow basal white bands. Wings with the forks densely scaled, especially at their bases, also at the base of the second long vein, the stem of the fourth, and the base of the upper fork

of the fifth, a pale area runs across the bases of the fork-cells. Legs brown, femora pale beneath ; tibiae with broad apical white spot ; tarsi with traces of pale basal banding.

♀. Head deep brown, with narrow-curved, pale creamy yellow scales, and small flat lateral ones, with pale brown upright forked scales ; palpi deep brown ; antennae brown, with ferruginous basal joint ; clypeus deep brown ; proboscis brown.

Thorax deep brown, deep ferruginous in the middle, with scanty narrow-curved, pale golden scales, arranged somewhat in irregular groups, two more or less prominent pale patches being seen in the middle, with numerous black hairs over the roots of the wings ; scutellum brown, with three distinct patches of pale creamy curved scales, rather broader than those on the mesothorax ; metanotum deep brown ; pleurae deep brown, with creamy scales in patches.

Abdomen deep brown, with narrow, basal, pale creamy-white bands, with dull golden posterior border-bristles and numerous lateral bristles ; venter mostly clothed with pale creamy scales, some of the segments with a median lateral dark spot.

Wings with the veins with long dense lateral brown scales, particularly in certain areas, giving it a spotted appearance, with a distinct pale pellucid band at the base of the fork-cells ; the first long vein has all dark scales ; the two branches of the first sub-marginal cell with long lateral scales particularly dark at

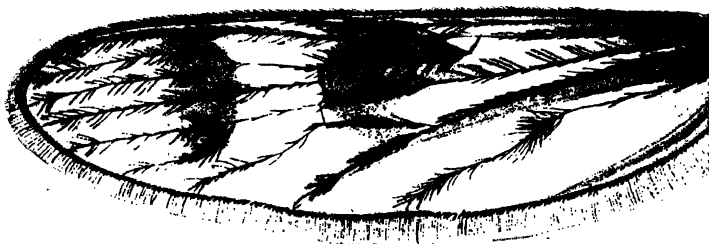


Fig. 82.

Wing of *Theobaldia incidens*. (♀.) Thomson.

the base of the fork, forming a spot, stem pale up to the cross-veins, then densely dark scaled, forming another spot ; third long vein with deep brown median and pale lateral scales ; second posterior cell with long lateral brown scales, forming a dark spot at the base of the cell, the stem pale up to the cross-

veins, the remainder with long dark brown lateral scales on one side only ; the fifth with dark scales, its upper branch only with long lateral scales ; sixth with long black lateral scales, closely applied to the vein ; fork-cells rather short, the first sub-marginal longer, and a little narrower than the second posterior, their bases about level, its stem not quite half the length of the cell ; stem of the second posterior about two-thirds the length of the cell ; posterior cross-vein close to the mid, in some specimens almost level with it ; cross-veins pale.

Legs deep brown, base of femora pale, venter with white scales ; apex of the tibiae with a distinct white band ; tarsi brown, with traces of pale banding basally ; unguis apparently equal and simple.

Length.—5 to 6 mm.

♂. Palpi longer than the proboscis, which is rather thick, the three apical joints with pale basal bands, that nearest the

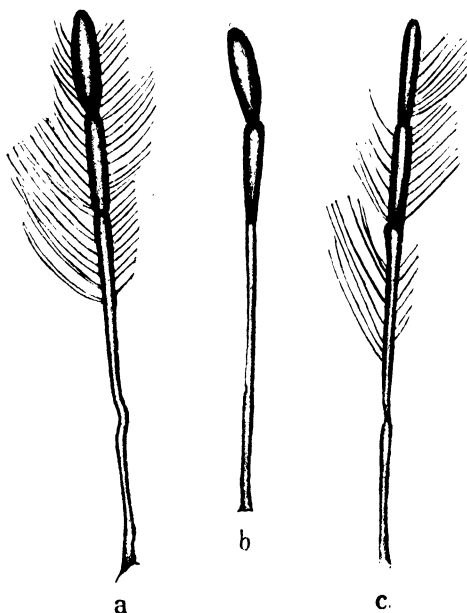


Fig. 83.

♂ Palpi of (a) *Theobaldia annulata*, (b), *T. spathipalpis*, and (c) *T. incidens*.

base being the broadest, the penultimate and most of the antepenultimate joints with long black hairs, the base of the apical

joint with a few small pale hairs; most of the apical joint without hairs.

Length.—5 to 6 mm.

Time of capture.—June.

Habitat.—California (Thomson); Lewiston, Idaho, Moscow; and Cornwallis, Oregon (Aldrich).

Observations.—This species was described by Thomson from California. I had seen nothing answering to it when the second volume went to press, but could not believe it to be the same as *C. nigripes* (Zetterstedt). It is a very marked species, the spots on the wings due to long scales, and the pale area at the base of the fork-cells being very characteristic. Thomson says nothing of the tarsi being banded, but these show distinct traces of dull testaceous basal bands in the specimens I have mounted from the *débris* saved from Professor Aldrich's consignment.

Professor Aldrich sends me the following note regarding its habits :—

"The principal character given by Thomson seems to be the dense scales of the section just before the cross-veins, the pellucid spot, nearly bare, just beyond them, and their coincidence (the "*incidens*" from which he drew the name), etc. The cross-veins are not always exactly coincident; but in some specimens they are. I believe the description suits sufficiently well. I send one specimen from Cornwallis, Oregon, a place much nearer the locality of original capture than this is. I only got this Corn-wallis specimen lately, when I was looking through the material at the Oregon Agricultural College. The species is rather rare at Moscow; still, it is our commonest mosquito, as we are blessed with an almost total absence of the family. I allowed a specimen of *incidens* to bite me not long ago, to see if there were any noticeable peculiarities in its habits. I had never been bitten by one before. It seemed to have no special peculiarities; it darted off before I expected it to. The spot swelled but a little and gave me no great inconvenience."

THEOBALDIA SPATHIPALPIS. Rondani.

Culex spathipalpis. Rondani.

(Mono. Culicid. I., p. 339, 1901.)

(Plate X.)

Additional localities.—Algeria (Dr. Sergeant); Touggourt, Algeria (Dr. Chaudoye); Teneriffe (Rev. E. A. Eaton and Dr.

Grabham); Madeira and St. Michael (Dr. Grabham); Crete; Cyprus (Miss Bate and Major Girvin); Cape of Good Hope, at Londale (Macvicar).

Observations.—Dr. Grabham writes from Madeira as follows: “Never found in houses. I have bred them from larvae which existed in great abundance in all stagnant collections of water, especially horse-ponds containing the refuse of stables. The people told me they had never observed this form attacking man or animals. They fed eagerly on banana slices, but never attempted to bite my hands. They were found mostly at St. Michaels, Azores, and bred from larvae found about Ponta Delgada and the mineral springs at Las Furnas. The ova are deposited in rafts.”

The single specimen received from South Africa was taken in a hospital at Londale (1300 feet altitude). In Cyprus they occur up to 5000 feet altitude, at Troiditissa.

Time of capture.—September, in Cyprus.

GENUS 19. **LUTZIA.** nov. gen.

(Plate XII.)

Scales of the head, thorax, and abdomen as in *Theobaldia*. The ♀ palpi 3-jointed, the small mammilliform apical joint of *Theobaldia* being absent; the last joint is very long and ends bluntly; there may be a small joint between the basal and penultimate, but I cannot detect it clearly in the ♀; ♂ palpi 3-jointed, the last joint acuminate, not clavate, slightly longer than the penultimate joint; all the joints very hairy except at the base of the palpi.

Wings spotted after the manner of *Myzomyia*. The wing scales (Plate XII.) partly *Culex*-like, partly *Taeniorhynchus*-like, the latter forming the dark spots and areas. Wing fringe spotted like a *Mucidus*.

A single species occurs in this genus, namely, the *Culex Bigotii* of Bellardi.

LUTZIA BIGOTII. Bellardi.

Culex Bigotii. Bellardi.

(Mono. Culicid. I., p. 343, 1901.)

Dr. Lutz originally suggested to me that this very marked *Culicine* should be placed in a new genus, consequently I have

named the genus after this great Brazilian dipterist, who has done so much in helping on the study of South American *Culicidae*.

♀. A fresh specimen has been received, and from this the photo of the wing is here reproduced. A ♂ has also been sent by Dr. Fajardo, which is described below.

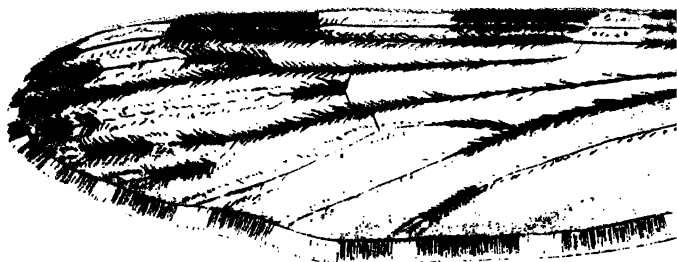


Fig. 84.

Wing of *Lutzia Bigotii*, ♀. Bellardi.

♂. Palpi banded creamy yellow and black, the apex broadly yellow, then a small black band and the base of the joint yellow; the second joint yellow at the base, the next joint deep yellow with black scales, the yellow showing as a broad and then a narrow pale band, all pale below; hairs long and dense, black at the black areas, yellow at the yellow, the hairs extend down to the second basal ring on the long basal joint. Proboscis deep brown, with a broad yellow band on the apical half and a yellow apex; antennae densely plumose; plume hairs yellowish at the base, brown apically, apex of the antennae brown. Abdomen black, with two round grey patches on the apical border of the third and fourth segments, a large round median patch on the apex of the fifth and sixth, and the last segments grey.

Legs with apical and basal pale bands and the last tarsal all pale ochraceous; fore and mid ungues unequal, thick, the larger uniserrated, the smaller (damaged); hind ungues equal and simple, much curved.

Length.—6 mm.

The larva, writes Dr. Lutz, has a peculiar position in water, the anterior parts of the body being parallel, but somewhat curved, while the posterior is hanging down obliquely.

Additional locality.—Belem, Brazil (Dr. Fajardo).

GENUS 20. **CULEX.** Linn.

(Mono. Culicid. I., p. 326, 1901.)

This genus has been reduced to some extent by separating off a number of species under the following genera:—*Theobaldia*, Neveu-Lemaire, *Lutzia*, *Melanoconion*, *Grabhamia*, *Lasioconops*, *Eptaphlebiomyia*, *Rhacomyia*, *Gilesia*, and *Finlaya*; and other previously described *Culex* have been incorporated in *Taeniorhynchus*.

The genus *Culex* as here treated still contains several species which will have to be excluded. Even when finally reduced to its narrowest limits it will probably prove a very large one.

I. WINGS SPOTTED.

CULEX MIMETICUS. Noe.

(Mono. Culicid. I., p. 329, 1901.)

Additional localities.—Cyprus, at Peripedia, 2,600 feet (Major Girvin); Perak (Dr. Wright), Canara district, Goa Frontier, India (H. E. Aitken); Kuala Lumpor (Dr. Durham).

Notes.—Giles ("Handbook of Gnats," 2nd ed., p. 390) says of this species: "Appears common in the hills in India, especially

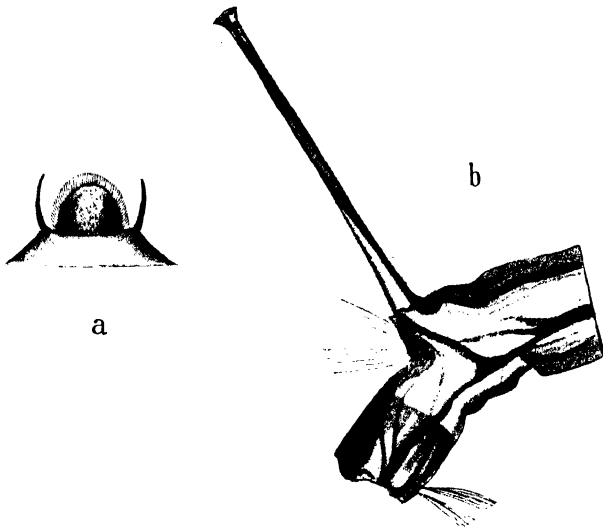


Fig. 85.
Larva of *Culex mimeticus*. Noe.
a, Front of head; b, caudal end.

in the Nilgiris, and also appears in the plains in the cooler seasons of the year."

Miss D. M. A. Bate informs me "that the larvae seen in Cyprus are semi-transparent green all over; they are extremely lively when disturbed, and seem to spend most of their time amongst the green weed, apparently not requiring to come to the surface so much as *Theobaldia spathipalpis*."

The larvae sent me have long thin respiratory siphons (Fig. 85).

II. WINGS UNSPOTTED.

a. *Legs banded.*

β. *Proboscis banded.*

CULEX JAPONICUS. Theobald.

(Mono. Culicid. I., p. 385, 1901.)

A single fresh specimen of this species has been received from Ceylon. It is smaller than those received from Japan, and the thoracic golden-scaled lines are more pronounced.

The abdomen has prominent silvery-white basal bands. There is a trace of a pale band on the proboscis; the hind femora, instead of being all basally white, has a large long ventral white patch.

The ♀ unguis of both the Japanese and Ceylon specimens are unserrated.

The specimen from Ceylon was taken by Mr. E. Green in October at Peradeniya. It forms a distinct local variety.

CULEX TAENIORHYNCHUS. Wiedemann.

(Mono. Culicid. I., p. 350, 1901.)

Additional localities.—Welldad, British Guiana (Dr. Low, July, 1901); Chancery Lane Swamp, Barbados (Dr. Low, September and October, 1901; bred from larvae); Vieux Fort, St. Lucia (Dr. Low); Antigua (Dr. Forrest); Cedros (common), Trinidad, caught in house (C. H. Hewlett); Para, Brazil (Dr. Durham).

Notes.—Mr. Forrest writes on July 31st, 1901:—"Culex XI. comes into the house in the evening like *M. titillans*. Although both are very common, I have not come across the larvae as yet."

Dr. Low took his British Guiana specimens in jungle growth under a mango tree near the coast.

Dr. Grabham writes of this species as follows:—"I was attacked a few days ago at dusk while passing through a swamp close to the sea, about five miles away from Kingston, by a number of mosquitoes; amongst them were *Culex taeniorhynchus*."

CULEX NOCTURNUS. n. sp.

Thorax deep brown, covered densely with narrow-curved, bright brown and pale golden scales, scarcely showing any definite ornamentation; proboscis with a minute black tip and base, remainder ochraceous.

Abdomen deep brown with basal white bands curved in the middle; legs deep brown, paler at their bases, hind metatarsi and all the tarsal joints with basal white bands, the fore and mid with last two tarsi unbanded. Wings unspotted.

♀. Head brown, with narrow curved pale golden scales on the crown, with black upright forked scales, flat black scales at the sides with a median white patch; palpi covered with deep brown scales; apex with yellow scales and a few scattered yellow scales over their whole length; antennae brown, basal

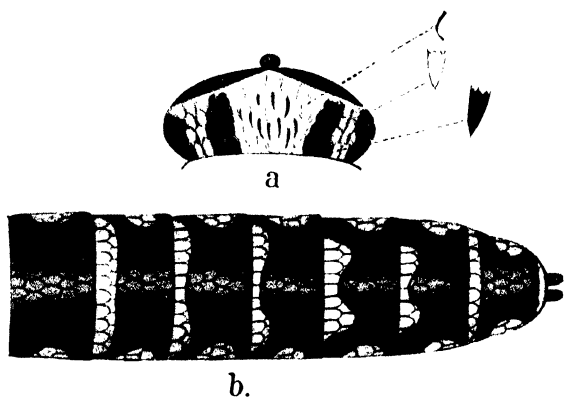


Fig. 86.

Culex nocturnus. n. sp.

a, Head; b, abdominal ornamentation.

joint and base of second joint testaceous; clypeus brown; proboscis with black apex and base, the broad median area golden brown.

Thorax deep brown, with narrow-curved pale golden and brown scales, with no well-defined arrangement, but giving the

thorax a more or less indistinct mottled appearance ; pleurae deep brown, with patches of white scales ; scutellum paler brown, with narrow-curved pale golden scales ; metanotum pale brown.

Abdomen deep brown, the base of the second, third and fourth segments with basal white bands, the fifth and sixth segments with median basal patches, constricted in the middle, the sixth and seventh segments with narrow apical yellow bands, no basal pale band or mark to the last ; laterally are median white spots ; venter ochraceous. Legs with coxae brown ; femora deep brown, grey and ochraceous at the base and beneath ; tibiae deep brown, paler ventrally ; metatarsi and first two tarsal segments of the fore and mid legs with pale basal bands, last two deep brown, unbanded ; in the hind legs all the tarsi are broadly pale banded ; fore and mid ungues equal, uniserrated, black ; hind ones small, equal, simple and pale brown.

Wings with brown scales of typical *Culex* form ; fork-cells short, the first sub-marginal longer and narrower than the second posterior cell, its stem more than two-thirds the length of the cell, its base about level with that of the second posterior ;



Fig 87.

Wing of *Culex nocturnus* (♀). n. sp.

second posterior cell broad where it joins the border of the wing, its stem longer than the cell ; posterior cross-vein rather small, nearly twice its own length distant from the mid-cross vein ; halteres with a pale stem and fuscous knob.

Length.—4 to 4.5 mm.

Habitat.—Fiji (Dr. Hall).

Time of appearance.—April, May and June.

Observations.—Described from several ♀'s taken by Dr. Hall at Ba in Fiji. It is found in houses and is active at night. The abdominal ornamentation is very characteristic ; the species cannot well be mistaken for any other. The proboscis is really very broadly pale banded.

CULEX MICROANNULATUS. Theobald.

(Mono. Culicid. I., p. 353, 1901.)

Additional localities.—Peradenya, Ceylon (E. E. Green); Mukerian, Hoshiarpur (Dr. Datta).

Notes.—This and the next three species are very closely related. *Culex alis* (p. 167) should also come close to these species.

CULEX VISHNUI. Theobald.

(Mono. Culicid. I., p. 355, 1901.)

Additional localities.—Quilon, Travancore, S. India (Captain James, 27.7.00); Sambalpur, Central Provinces (D. O. C. Murphy, 26.10.00), in rice fields; Dacca.

CULEX SITIENS. Weidemann.

(Mono. Culicid. I., p. 360, 1901.)

Additional locality.—Quilon, Travancore (Captain James, 10.7.00).

Note.—Doubt has been expressed as to the correct identity of this species. There are now known to be several like it, so that it is not possible to be certain without seeing the type, which I cannot trace.

CULEX IMPELLENS. Walker.

(Mono. Culicid. I., p. 362, 1901.)

Additional localities.—Kelani Valley, and Batticalora, Ceylon (E. Green, April); Mukerian, Hoshiarpur (Dr. Datta, 26.10.00); Perak (Dr. Wright); Kuala Lumpur (Dr. Durham).

♂. Hind metatarsi a little longer than the hind tibiae. Palpi with three narrow yellow bands and two very broad ones towards the base, apex pale with pale hairs, the next two small pale bands are at the base of the segments; the two apical segments the same length; the next long segment has two broad pale bands, the basal one commencing at the notch, which is very distinct; hair-tufts on the two apical joints, and apex of

the antepenultimate joint black. Legs, abdomen, and thorax as in ♀ ; fore unguis unequal.

Length.—4·5 mm.

Habitat.—Kuala Lumpur (Dr. Durham).

Time of capture.—July.

Notes.—I had not previously seen a male, but one has been sent by Dr. Durham, which is here described. The ♀ has simple unguis. The *larva*, Dr. Durham says, rests with its body at nearly right angles to the siphon.

CULEX ANNULUS. Theobald.

(Mono. Culicid. I., p. 358, 1901.)

Additional locality.—Dindings, Straits Settlements, in October, November, and December.

CULEX HIRSUTIPALPIS. Theobald.

(Mono. Culicid. I., p. 378, 1901.)

Note.—Specimens received from Mashonaland (per Mr. Marshall), taken in March, show the ♂'s to have the yellow apical abdominal spots not always clearly defined.

CULEX ALBIROSTRIS. Macquart.

(Dipt. Exot., sup. iv., p. 10; Mono. Culicid. I., p. 382, 1901, Theobald.)

Additional locality.—Port Darwin, South Australia.

Note.—Specimens of a broadly pale banded proboscis species have been received, evidently the New Zealand *albirostris*.

CULEX ANNULIROSTRIS. Skuse.

(Mono. Culicid. I., p. 365, 1901.)

A number of ♂'s and ♀'s bred from larvae taken in sea-water of sp. gr. 1030 and 1040 by Dr. Bancroft. They are also found in fresh water. Some variation may be noticed in the width of the pale band on the rostrum. One ♀ differs from any I have previously seen, in having the basal white abdominal bands of the third to sixth segments with triangular expansions in the middle. Another has triangular projections on the first to fourth segments.

All the specimens were bred in January.

CULEX ANNULIORIS. Theobald.

(Mono. Culicid. I., p. 371, 1901.)

(Plate IX).

Additional locality.—Pretoria (Dr. Theiler). A series of ♂'s and ♀'s. No ♂ had previously been received.

♂. Thorax and abdomen much as in the ♀, no apical lateral creamy-white spots on the first and second segments. Palpi deep brown, with five creamy bands, the second from the base broad, the last forming the apex of the palpi; plume-hairs black, except on the apical segment, where they are creamy-yellow, the apex with a few black bristles; proboscis deep brown, with a narrow median pale band, swollen along its apical half; antennae banded deep brown and grey, with black plumes (Plate IX). Legs deep brown, mottled to some extent with pale scales, femora pallid beneath; tibiae brown, with small scattered pale scales, the banding of the tarsi involving both sides of the joints, except the last tarsus; fore and mid unguis unequal, both uniserrated; hind small, equal and simple.

Wings with brown scales, the linear lateral ones rather broad, some of the median ones almost *Taeniorhynchus*-like; the first submarginal cell longer and narrower than the second posterior cell, its base a little nearer the apex of the wing than that of the



Fig. 88.

Wing of *Culex annulioris*, ♂. Theobald.

second posterior cell, its stem rather more than half the length of the cell; stem of the second posterior about two-thirds the length of the cell; posterior cross-vein longer than the mid, twice its own length distant from the mid cross-vein.

Length.—6 mm.

CULEX GNOPHODES. n. sp.

Thorax deep brown, with brown and fawn-coloured scales, the latter forming a curved paler area on each side. Proboscis black,

with a small pale median band. Abdomen black, with basal white bands. Legs brown, with a trace of pale banding at the tibio-metatarsal joints, and at the base of the first two tarsi. Base of the second posterior cell nearer the base of the wing than that of the first sub-marginal.

♀. Head black, with narrow-curved pale scales and black upright forked ones, flat grey ones at the sides of the head; antennae brown, basal joint testaceous outside, dark on the inside, base of the second joint testaceous; palpi scaled with black, a few white ones at the apex; clypeus deep brown; proboscis black-scaled, with a median pale band.

Thorax dark brown, with dark brown, dull pale brown, and fawn coloured narrow-curved scales, the latter forming an indistinct lateral curved patch about the middle of the mesonotum; scutellum deep brown, with narrow-curved pale scales; metanotum deep brown; pleurae brown, with three pale patches of scales.

Abdomen black, covered with deep black scales, the second to sixth segments with basal white bands, the seventh with basal white lateral spots, the last with a median basal white spot, the basal segment black, with two patches of black scales, with a few grey ones in the middle; venter black, with basal white bands, testaceous at the base.

Legs brown; femora pale beneath; the mid and hind legs show a narrow pale tibio-metatarsal band, not seen in the fore legs; the first two tarsi, and, to some extent, the third, with minute basal pale rings, only noticeable in certain lights; unguis equal and simple.

Wings with typical brown *Culex* scales, the first sub-marginal cell about the same length, but narrower than the second posterior cell, its base nearer the apex of the wing than that of the second posterior cell, its stem equal to two-thirds the length of the cell; stem of the second posterior cell also about two-thirds the length of the cell; posterior cross-vein twice its own length distant from the mid. Halteres ochraceous, with grey scales on the knob.

Length.—5.5 mm.

Habitat.—Dindings, Straits Settlements.

Time of capture.—November.

Observations.—Described from a single ♀, perfect save for the hind legs, which are partly destroyed. It is closely related to *Culex microannulatus*, but can at once be told by the relative

positions of the fork-cells and cross-veins, and by the abdominal banding and ornamentation. The specimen was taken at the Rest House at Bruas, Dindings.

CULEX TRANSVAALENSIS. n. sp.

Thorax deep brown, with golden-brown scales, ornamented with pale scales at the sides in front, and forming two eye-like spots in the middle of the mesonotum, almost white on the scutellum; pleurae brown, with white scales; proboscis pale ochraceous, black at the base and apex; palpi black, with white scales. Abdomen black, with broad basal white bands. Legs

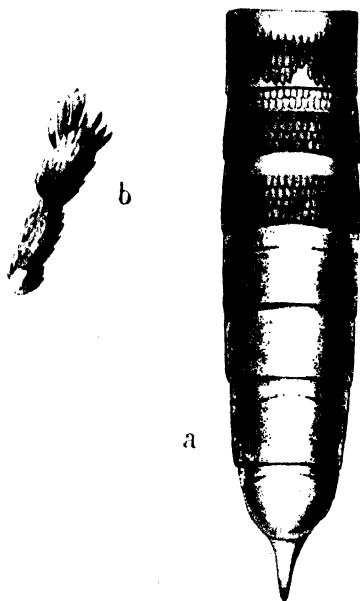


Fig. 89.

Culex Transvaalensis. Theobald.

a, Abdomen of ♀ (last four segments not completed); b, ♀ palp.

brown, with broad basal white bands; femora, tibiae, and metatarsi mottled with white; unguis uniserrated.

♀. Head brown, with narrow-curved grey scales, except in the middle, where they are bright ochraceous, laterally a patch of flat black, and then flat white scales, upright forked-scales black; palpi (Fig. 89, b) densely scaled with black scales and a few white

ones, with a dense white apical tuft ; proboscis ochraceous, with a few black scales at the base, and a black apex ; clypeus deep brown ; antennae deep brown, the basal joints with small flat pale scales.

Thorax deep brown, with narrow-curved golden-brown scales, ornamented with some broader white ones in front, and similar scales forming two distinct round spots about the middle of the mesonotum, similar pale scales at the edges of the mesonotum and in front of the scutellum ; bristles rather thick laterally, deep brown ; scutellum covered with almost white narrow-curved scales, forming three dense patches ; border-bristles brown, six to the mid lobe ; metanotum deep brown ; pleurae deep brown, with white scales.

Abdomen black, covered with deep violet-black scales, with basal white bands ; the first segment has two large patches of black scales ; the second has the basal white band passing down two-thirds of the middle of the segment ; in the apical segments the bands spread out laterally ; the ovipositor rather long, black ; venter white, with narrow black apical scales.

Legs deep brown, mottled with white and creamy scales, especially on the metatarsi, first two tarsal joints of the fore and mid legs with broad basal white bands ; in the hind legs all the joints with broad basal white bands ; unguis of the fore, mid, and hind legs equal, thick, uniserrated.

Wings with the veins covered with typical brown *Culex* scales ; the first sub-marginal cell longer and narrower than the second posterior cell, its base very slightly nearer the base of the wing, its stem more than half the length of the cell ; stem of the second posterior as long as the cell ; posterior cross-vein nearly twice its own length distant from the mid ; the first and third longitudinal veins darker than the rest. Halteres pale ochraceous.

Length.—5 mm.

Habitat.—Pretoria (Dr. Theiler).

Time of capture.—February and March.

Observations.—It is very distinct, and easily identified by the speckled legs and broad basal white banding ; the densely-scaled apices of the palpi and the dense scutellar scales are also characteristic. Described from a number of specimens sent by Dr. Theiler (per Col. David Bruce, F.R.S.).

CULEX ALIS. n. sp.

Thorax brown, ornamented with brown and pale scales, the latter on each side in front and forming two large pale spots towards the centre of the mesonotum, and also pale in front of the scutellum. Head dark brown, with paler scales, creamy white at the sides; proboscis deep brown, with a median pale band. Abdomen brown, with pale basal bands; legs deep brown, with narrow pale basal bands to the joints; the tibio-metatarsal joint pale on each side. *Wings with the fork-cells short, their stems longer than their cells*, the base of the first sub-marginal much the nearer to the apex of the wing.

♀. Head deep brown, with narrow-curved, pale golden scales and flat white ones at the sides of the head, border round the eyes pale, there are numerous ochraceous, upright forked ones over the occiput; clypeus, palpi and antennae deep brown, the former with whitish hairs at the tips; proboscis deep brown, with a narrow yet pronounced pale creamy median band.

Thorax deep brown, with golden brown narrow-curved scales, they are of a creamy colour at the sides of the front of the mesonotum, and spread on to the dorsum about its middle, forming two large pale spot-like areas; there are also pale scales around the bare space in front of the scutellum; bristles black; scutellum brown, with narrow-curved pale scales and six black border-bristles to the mid lobe; metanotum brown; pleurae brown to deep brown, with small patches of flat grey scales.

Abdomen brown, with basal creamy bands and white lateral spots, also an apical white lateral spot on the antepenultimate segment; venter with broad basal pale bands and white basal lateral spots.

Legs deep brown, bases a little paler, with some white scales, also base and venter of femora, knee-spot indistinctly pale on the fore and mid legs, but white in the hind; tibio-metatarsal joint yellow, the band involving both sides of the joint, especially in the hind legs; narrow pale basal bands to the metatarsi and tarsi scarcely perceptible on the last tarsal of each leg; ungues small, equal and simple.

Wings densely scaled, with rather long broadish brown scales; fork-cells relatively short, the first sub-marginal cell scarcely longer, but narrower than the second posterior, its base much nearer the apex of the wing than that of the second posterior, its stem longer than the cell; stem of the second posterior cell as long as

the cell; posterior cross-vein rather more than three times its own length distant from the mid-cross vein. Halteres pale, with fuscous knob.

Length.—4 to 4.5 mm.

♂. Palpi deep brown, with a narrow pale band at the apex, and another at the base of the penultimate joint and a broad pale one on the long antepenultimate joint, the last two and the apex of the antepenultimate joints with long black hairs; a very distinct notch on the antepenultimate joint; apex paler; last two joints of equal size. Proboscis with a rather narrower pale band than in the ♀. Fore and mid unguis unequal and unserrated, hind small, equal and simple; venation much as in the ♀, but the stem of the first submarginal cell much longer than the cell.

Length.—4 mm.

Time of capture.—December.

Habitat.—Christmas Island (Dr. Durham).

Observations.—Described from a series bred by Dr. Durham from larvae found in salt pools on Christmas Island. It comes in the same group as *Culex Vishnui*, *C. microannulatus*, etc., but can easily be told from any of them by the much longer stalks to the fork-cells, the narrower and more densely-scaled veins, and the great distance of the posterior cross-vein from the mid, which seems constant in this species. The venation of the ♀ is thus more

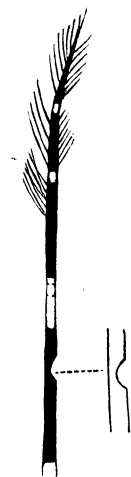


Fig. 90.

Culex alis, n. sp.
♂ palpus.

like a ♂, in fact, there is but very slight difference between the ♂ and ♀ wings in this species. The abdomen is to some extent variable in appearance in the dead specimens, probably due to shrinkage. The basal lateral spots and the apical one on the antepenultimate segment are often indistinct in shrunken specimens.

The thorax is distinctly ornamented, a character which I have not seen before in this banded proboscis group.

CULEX THALASSIUS. n. sp.

Proboscis with a narrow median white band. Thorax dark brown, with narrow curved deep golden-brown scales. Abdomen dark brownish-black, with narrow basal grey bands, often absent; penultimate segment with lateral white spots only; pleurae very

pale grey. Legs deep brown, with faint pale bands to some of the mid and fore tarsi; apices of tibiae pale, hind legs unbanded. Bases of the fork-cells nearly level.

♀. Head deep brown, with narrow-curved pale greyish scales and black upright forked ones; palpi black; proboscis black, with a narrow clear pale band; antennae brown; clypeus black.

Thorax deep brown, with narrow rich brown pale scales; scutellum brown, with golden brown narrow-curved scales and deep brown border-bristles; pleurae very pale shiny grey; metanotum deep brown.

Abdomen black, with narrow basal white bands, or unbanded, with traces of basal white lateral spots; venter dark, with broad basal grey bands.

Legs black, bases pallid, also the venter of the femora, the apex of the femora, and to some extent the tibiae, pale; metatarsi and tarsi with narrow basal pale bands, indistinct on the last two segments; hind metatarsi and tibiae of about equal length.

Wings with brown scales; fork-cells rather short, their bases about level; the first sub-marginal cell longer and a little narrower than the second posterior, its stem a little more than



Fig. 91.

Wing of *Culex thalassius*. ♀. n. sp.

half the length of the cell; stem of the second posterior not quite two-thirds the length of the cell; posterior cross-vein more than its own length distant from the mid-cross vein.

Length.—4.5 mm.

Habitat.—Gambia (Dutton).

Time of capture.—October and November.

Observations.—Described from a series taken and bred by Dr. Dutton. The larvae were mostly taken in a drain of tidal water and others from a pool in a mangrove swamp, others from a canoe on the foreshore, and some from a pool of tidal water that had soaked through sand into a drain.

The species is very variable; some show distinct abdominal banding, others none at all. It somewhat resembles *C. Duttoni*, but it is smaller, more fragile, and the legs have only faint basal banding, and the fork-cells are slightly different. This species and *C. Duttoni* come very close together, but are evidently distinct.

CULEX ANARMOSTUS. n. sp.

Thorax dark brown to brown, with two darker median parallel lines on the denuded surface, covered with pale, dull golden, narrow-curved scales, showing faint longitudinal arrangement. Proboscis with a pale creamy band. Abdomen brown, with curved basal white bands. Legs brown, with faint apical and basal pale banding. Ungues equal and simple.

♀. Head brown, with narrow-curved pale creamy-grey scales, brown upright forked ones and small flat white ones at the sides and whitish curved ones around the eyes; proboscis brown, with a median pale band, very distinct beneath; palpi black, with a few white scales; clypeus black; antennae dark brown, basal joint testaceous.

Thorax brown to almost black, covered with narrow curved golden scales, somewhat paler behind, to some extent arranged longitudinally; scutellum paler brown, with pale narrow-curved scales; metanotum deep brown; pleurae pale brown and cinereous, with a few patches of grey scales.

Abdomen deep brown, with curved white to creamy white basal bands; first segment nude, save for two median patches of black scales; border-bristles pale; venter white, with narrow apical borders of brown scales.

Legs brown; femora pale ventrally; apex of tibiae white; base and apex of the metatarsi and first two tarsals pale banded; also a white knee-spot on the hind legs; femora and tibiae bristly; unguis equal and simple; hind tibiae about the same length as the hind metatarsi.

Wings with brown scales, those of the third and fifth being the darkest; first sub-marginal cell longer and a little narrower than the second posterior cell, its base a little nearer the base of the wing than that of the latter, its stem half the length of the cell; stem of the second posterior about two-thirds the length of the cell; posterior cross-vein about its own length distant from the mid-cross vein, the median vein-scales of the third, fifth, and

to some extent the lower branch of the second fork-cell, rather larger than in most *Culex* and very dark. Halteres pale.

Length.—4·5 mm.

Habitat.—Gambia (Dutton); Free Town (Austen).

Time of capture.—September (Austen); November (Dutton).

Observations.—Described from a single ♀ bred from a larva found in a drain at Free Town by Mr. Austen. A specimen brought back by Dr. Dutton is evidently this species, but it is too damaged to be sure of its identification.

This species differs from *Culex dissimilis*, Theobald, in that the base of the first fork-cell is nearer the base of the wing than that of the second posterior-cell, but it is closely allied. Dr. Dutton found that *Filaria nocturna* only partly developed in it.

CULEX APICALIS. n. sp.

Proboscis with a faint pale band. Thorax rich umber-brown, with scanty irregular ornamentation of pale golden scales. Abdomen brown, with apical silvery spots, especially prominent in the ♂ and almost forming bands. Legs dark brown, with the femora and tibiae spotted, and the tarsi with basal white bands.

♀. Head with narrow-curved grey scales and numerous black upright forked ones; proboscis dark brown, with a narrow pale band on the apical half, very distinct in some lights; palpi dark brown, with a few white scales at the apex, apparently truncated; antennae brown, with narrow pale bands.

Thorax deep rich umber-brown, with narrow-curved dull scales and some pale golden ones giving irregular ornamentation, especially at the sides, and a few in the middle of the mesothorax; scutellum brown (denuded), with eight median lobe border-bristles; metanotum rich brown; pleurae bright brown, with patches of pale scales.

Abdomen deep brown, with apical silvery white lateral spots, which show on the dorsum; apical and basal segments all brown; border-bristles dull brown; venter ochraceous.

Legs deep brown; the femora and tibiae with creamy white spots, especially prominent on the latter; the femora have a clear garter-like ring near the apex; fore and mid metatarsi and first two tarsals with narrow basal white bands; hind tarsi all basally banded, tibiae with pale hairs; ungues equal and simple.

Wings with the veins clothed with typical brown *Culex* scales; fork-cells of moderate and nearly equal length and width, base of the second posterior cell if anything slightly the nearer the base of the wings; stem of the first sub-marginal about half the length of the cell; stem of the second posterior rather more than half the length of the cell; posterior cross-vein short, nearly twice its own length from the mid; halteres very pale ochraceous.

Length.—4.5 mm. to 5.0 mm.

♂. Ornamented much as in the ♀, but the apical silvery lateral spots spread far on to the dorsum, and form *nearly* complete apical bands on some of the segments. Palpi thin, dark brown, the apical joints of nearly equal length and with basal white bands and with brown hairs, a few of the latter on the apex of the long antepenultimate joint, which has a pale band on the basal half; proboscis with a pale band on the apical half; antennae with the plume-hairs rich brown. The unguis of the fore and mid legs unequal, the larger biserrated, of the hind equal and simple.

Length.—4.3 mm. to 4.5 mm.

Habitat.—Sao Paulo, Brazil (Dr. Lutz), and Para (Dr. Durham).

Observations.—Described from a ♂ and ♀ in fair preservation. A number of specimens have also been received from Para. It is a very marked species, easily told from all *Culex* with banded proboscis by the speckled legs and silvery apical lateral spots, which in the ♂ specimen almost unite to form apical bands. It might easily be mistaken for *Taeniorhynchus confinnis* (Arribalzaga), but an examination of the wing scales at once shows the difference. In most other points they exactly agree, but the fork-cells are not relatively

so long as in *confinnis*, and the species seem generally of smaller size. There is considerable variation in the relative size of the fork-cells however.

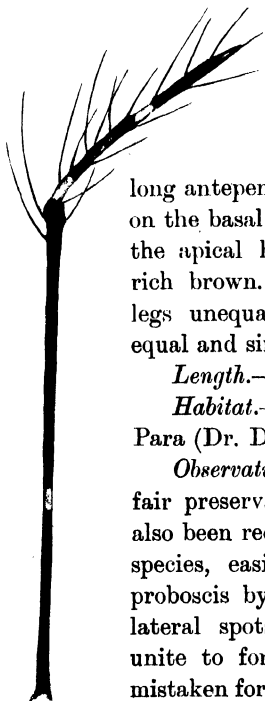


Fig. 92.
Culex apicalis.
n. sp.
♂ palpi.

CULEX CORNIGER. n. sp.

Thorax chestnut-brown, surrounded with creamy scales, which also form an inwardly projecting branch on each side to half way across the mesonotum; abdomen black, with basal white median patches forming almost bands and basal white lateral spots. Wings with deep brown-scaled veins. Legs black, femora and tibiae with apical white spots; metatarsi and tarsi with apical and basal banding, most prominent on the hind legs; proboscis black, with an indistinct trace of pale banding.

♀. Head brown, covered with narrow-curved pale golden scales, ochraceous upright forked scales in the middle and dark ones at the sides, showing as two indistinct dark lateral patches, the scales around the eyes and at the sides very much paler than those on the occiput; clypeus, palpi and antennae black; proboscis deep brown basally, black towards the apex, with an indistinct pale band on the apical half.

Thorax deep brown, with narrow-curved brown scales, chestnut-brown in some lights, almost bronzy in others, the sides of the mesonotum with a broad band of pale creamy scales, from which springs on each side an inwardly projecting branch half across the mesonotum about its middle; in front of the scutellum are a few grey scales, and on the mid lobe of the scutellum a prominent patch of the same, border-bridles long, rich brown, eleven to the mid lobe; metanotum deep brown; pleurae paler brown, with a patch of grey scales.

Abdomen black, with basal creamy curved patches scarcely forming complete bands, small basal lateral white spots, which are very prominent on the penultimate segment; on the venter the abdomen has broad basal creamy bands; posterior border-bridles pale, shortest in the middle of each segment.

Legs deep brown to almost black, apices of the femora and tibiae pale, the metatarsi and tarsi with apical and basal pale bands, very indistinct on the fore legs, distinct and broader on the hind legs, except the last tarsal joint, which scarcely shows any banding; unguis small, equal and simple.

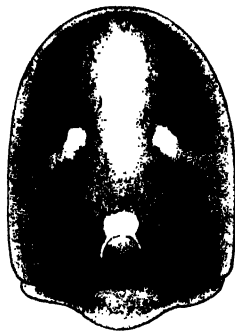


Fig. 93.
Mesothorax of *Culex corniger*.
n. sp.

Wings with typical brown *Culex* scales; first sub-marginal cell longer and narrower than the second posterior cell, its base considerably nearer the base of the wing than that of the latter; stem of the first sub-marginal very short, almost as short as in *C. pipiens*, stem of the second posterior about two-thirds the length of the cell; posterior cross-vein a little more than its own length distant from the mid-cross vein; third long vein, also the fifth and sixth and basal portion of the fourth, second and all the costal darker scaled than the rest. Halteres with almost white stem and pale ochraceous knob.

Length.—5.5 mm.

♂. Palpi deep brown, with yellow bands; abdomen with basal white bands; unguis of the fore and mid legs unequal, uniserrated, hind equal and simple.

Length.—5.5 mm.

Locality.—Para, Brazil (Prof. Goeldi); Rio de Janeiro (Lutz).

Time of capture.—30.8.02 (Dr. Lutz).

Observations.—Described from two females and a male collected by Prof. Goeldi. It can at once be told by the thoracic ornamentation.

There is another female and three males which show no thoracic ornamentation with a hand lens and which would be mistaken for *C. cingulatus*, F., but careful examination with the microscope shows traces of the ornamentation and also the large number of mid scutellar chaetae.

Dr. Lutz has also sent me a male and female which he bred, and pointed out at the same time their resemblance to *C. cingulatus*.

ββ. *Proboscis unbanded.*

δ. *Legs basally banded.*

CULEX VITTIGER. Skuse.

(Mono. Culicid. I., p. 387, 1901.)

Dr. Bancroft has observed the method of egg-laying in this species. The eggs are laid separately, but all close together; they are very large eggs and different in shape, he finds, from the general type of *Culex* egg.

I have not had time to re-examine this species, but I am sure it must be removed from *Culex*.

CULEX ALBOANNULATUS. Macquart.

(Mono. Culicid. I., p. 389, 1901.)

Additional locality.—Como, Mittagong, New South Wales; bred from larvae from May 14th to 29th (Froggatt).

CULEX IMITATOR. n. sp.

Head with silvery-white narrow-curved scales, thorax brown, ornamented with narrow-curved, bright chestnut-brown and silvery scales, as follows: chestnut-brown in the middle, with two narrow parallel silvery lines in front, formed by two narrow white-scaled lines on the sides of two bare parallel lines, a few pale scales forming a short indistinct third line between and a few white scales behind; sides densely silvery-white scaled. Abdomen deep brown, with basal white bands, expanding laterally into basal white spots. Fore and mid legs unbanded, hind with broad basal white bands.

♂. Head brown, covered with silvery-white narrow-curved scales on the occiput, with a dividing line in the middle, the scales turning outwards on each side from this line, sides of the head covered with small flat white, then flat dusky scales. Proboscis dark brown, almost black, slightly expanded apically; palpi as long as the proboscis, black scaled, with four white bands, the bands being on the basal part of the joints; the apical joint slightly shorter than the penultimate, both with a few long black bristles, base of palpi white. Antennae brown, with brown plumes.

Thorax brown, ornamented with small, bright, chestnut-brown and silvery, narrow-curved scales, as follows: Bright chestnut-brown in the middle, with two parallel bare lines and a narrow border of white scales on each side of the bare lines in front, a few white scales in the middle in front, pure silvery white at the sides of the mesothorax and scattered white scales at the back; bristles brown, longish, thick over the roots of the wings; scutellum testaceous brown, covered with narrow-curved white scales and with six brown border-bristles to the mid lobe; metanotum brown; pleurae pallid.

Abdomen deep brown to black, with basal white bands,

which spread out laterally to form basal white spots, last segment with all dull white scales, hairy ; border-bristles short in the

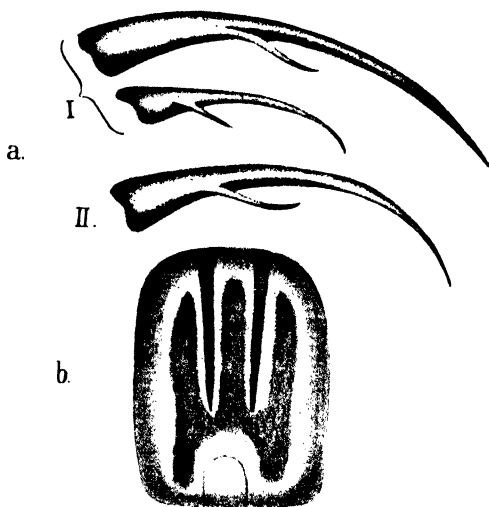


Fig. 94.

Culex imitator. n. sp.

a, male unguis (I, fore ; II, mid) ; b, thoracic ornamentation

middle of the segments. Legs dark brown, femora pallid beneath, the fore and mid unbanded, the hind with broad basal white bands on the metatarsi and tarsi ; the fore legs have an apical white spot on the femora and tibiae ; the mid have an apical white femoral and tibial spot and a small basal white spot, almost a band on the metatarsi ; fore and mid claws unequal, hind equal ; the fore claws both unserrated ; the larger one of the mid very narrow and fragile, with a very thin curved tooth on its basal half ; (smaller tooth?).

Wings with typical *Culex* scales ; fork-cells of moderate size, first sub-marginal longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem less than half the length of the cell ; stem of the second posterior cell nearly as long as the cell ; posterior cross-vein at least three times its own length distant from the mid cross-vein. Halteres with pale ochraceous stem and pale brown knob.

Length.—3 mm.

Habitat.—Brazil (Dr. Lutz).

Observations.—Described from a single perfect male. It is a very distinct species, resembling at first sight *Stegomyia fasciata*, but easily distinguished by the absence of banding on the fore and mid legs, but especially by the scale structure, which shows it to be a typical *Culex*, the scales of the head and scutellum being narrow-curved ones, not flat as in the genus *Stegomyia*.

Dr. Lutz sent me this specimen, stating it to be a "bromelia feeder."

CULEX PLEURISTRIATUS. n. sp. (Lutz MS.)

Thorax rich brown, ornamented with creamy golden and black scales; pleurae very pale, with two broken parallel brown lines. Abdomen deep brown, with basal lateral white spots. Proboscis black, unbanded. Legs deep brown, the fore unbanded, the mid and the hind with very narrow pale basal bands.

♀. Head ornamented, with narrow-curved silvery-white scales on the crown and front, the sides with flat white, and then flat ochraceous and brown scales, the upright forked scales in the middle are bright ochraceous, with a patch of jet black ones on each side; palpi, proboscis and antennae black.

Thorax brown, ornamented with creamy, golden and black narrow-curved scales as follows: The creamy ones forming a line on each side in front and a patch in front of the bare space in front of the scutellum and on each side of it; the golden scales form more or less a median area anteriorly, the spaces between which are rich brown, having small jet-black curved scales; scutellum brown, with narrow-curved pale scales and a few black ones; six border-bristles to the mid lobe; metanotum brown; pleurae pallid grey, with a broad dark line over the base of the legs and another more irregular one above it; there are also grey flat scales on the pleurae.

Abdomen black, the first segment nude, with two patches of black scales, the second segment with a median basal white patch, the third unadorned, the next four with basal lateral white spots, which in some specimens spread out and almost form narrow bands; border-bristles pale golden; the fourth segment has a median pale bristle; in one specimen the first, second and third segments have median white spots; venter brown, with basal white ornamentation; legs deep blackish-brown, with the coxae very pale grey; the fore legs usually unbanded, the mid and the hind have narrow white basal bands to some or all of the tarsi and metatarsi; ungues small, equal and simple.

Wings with the veins clothed with typical *Culex* scales; the first sub-marginal cell longer and narrower than the second posterior cell, its base much nearer the base of the wing than that of the latter; stem of the first sub-marginal very short, of the second posterior nearly as long as the cell; posterior cross-vein about three times its own length distant from the mid cross-vein. Halteres with grey stem, with a black streak at the "elbow" and a black knob.

Length.—4 mm.

Habitat.—Sao Paulo, Brazil (Dr. Lutz).

Observations.—Described from some specimens sent me by Dr. Lutz, who proposed the name I have adopted. It seems to vary considerably. I think it comes well in the genus *Culex*, although the wing scales are dense apically, giving it the appearance of a *Melanoconops*. The cephalic ornamentation is very marked.

CULEX MARINUS. Theobald.

(Mono. Culicid. I., p. 396, 1901.)

Six ♂'s of this species have been sent by Dr. Bancroft from Queensland taken in December and January. One specimen bred from a larva taken in salt water of sp. gr. 1050. They breed in fresh as well as salt water.

In the description of this species given in Vol. I., p. 396, no mention is made of the mid unguis of the male; these are rather peculiar. The larger claw has a small basal tooth and a blunt process scarcely to be called a tooth, on the apical half; the smaller unguis is about half the size of the larger and is uniserrated.

The ♂'s vary from 5 to 6 mm. This insect was sent by Dr. Bancroft as *C. vigilax*, Skuse. The latter species can easily be told from *C. marinus* by the much broader and darker scales on the mesonotum. *Culex marinus*, according to Dr. Bancroft, is a day flier. This is the species he experimented with in connection with the nematode *Filaria immitis*, but found the embryos of the canine parasite did not metamorphose in it and after a few days disappeared.*

Several specimens recently received have the first sub-marginal cell ending nearer the base of the wing than that of the base of the second posterior cell as in *C. vigilax*. The broad banding on the proboscis rather indistinct.

* Jour. and Proc. Roy. Soc., N. S. Wales, vol. xxxv., p. 41, 1901.

These specimens were taken in April, May and December in N. S. Wales.

Additional localities.—Sydney, Woy Woy, Croydon and Como, New South Wales.

CULEX CANTANS. Meigen.

(Mono. Culicid. I., p. 401, 1901.)

The ungues of the ♀ are, as described by Ficalbi, all uniserrated; the hind ones are not simple as given in the text (of Vol. I., p. 402). The figure (No. 141, II.) refers correctly to what I believe is *C. annulipes*, which has simple hind ungues. *C. cantans* is a sylvan species, which Mr. W. R. Jeffreys, of Ashford, assures me is vicious in the woods in the weald of Kent. It bites at dusk, especially choosing the ankles.

Culex maculatus.—Meigen was wrongly given in Vol. I., p. 401, as a synonym of this species. It is evidently *C. nemorosus*.

CULEX PROCAX. Skuse.

(Mono. Culicid. I., p. 384, 1901.)

Dr. Bancroft has sent two ♀'s from Queensland which answer exactly to Skuse's description, but they are somewhat larger (4.5 mm.). The reddish-brown thorax is covered with narrow curved golden scales; the banding is not very clear in the fore and mid legs, and the mid cross-vein is no longer than the others in both specimens.

CULEX OCCIDENTALIS. Skuse.

(Proc. Linn. Soc., N. S. Wales, p. 1729, 1889, Skuse; Mono. Culicid. I., p. 419, 1901, Theobald.)

♂. Palpi deep brown, with a white basal band to the apical and penultimate joints and a third broad pale band lower down; hair-tufts on the last two joints and on the apex of the antepenultimate pale brown; apical joint considerably shorter than the penultimate joint. Antennae with bright brown plume hairs. Proboscis thin, black.

Thorax ornamented as in the ♀.

Abdomen with distinct basal white bands.

Legs banded as in the ♀, but the femora mottled with yellow instead of white scales; fore and mid ungues unequal, both uniserrated; hind equal, thick, uniserrated.

Length.—5.5 mm.

Habitat.—South Queensland (Bancroft); and Somerville, Victoria (Froggatt).

Time of capture.—August.

Observations.—I had previously redescribed the ♀ from Victoria, but no ♂'s were received. Dr. Bancroft now sends a series of ♂ and ♀'s from South Queensland. The ♂ is peculiar in having the hind unguis thick and uniserrated. The palpi are also markedly ornamented.

Mr. Froggatt sends some ♀'s from Victoria, taken in September, which all show the proboscis dark ochraceous, the apex and base black. The palpi are scattered all over with pale scales.

888. *Legs apically and basally banded.*

CULEX GELIDUS. Theobald.

(Mono. Culicid. II., p. 20, 1901.)

Additional localities.—Quilon, 3 ♀'s and 1 ♂ from Captain James (there is a distinct pale proboscis band, thus differing from the type); Ceylon at Kelani Valley, Peradeniya, in July and September (Green); Dindings, Straits Settlements, in November, and also at Dacca and Perak.

Note.—The specimens sent by Mr. Cornford from China form a distinct variety (*sinensis*) described below.

Variety *cuneatus* has also been sent by Mr. Green from Ceylon.

Var. *sinensis*. n. v.

♀. Head with black upright forked scales at the sides as well as the white ones at the back and middle; palpi with a white scaled apex and pale scales scattered over them; proboscis black with a median narrow yellow band. The median lobe of the scutellum has pale scales at its edge as well as the small black ones.

Abdomen with broad yellow apical bands as well as basal bands.

Stem of first sub-marginal cell more than half the length of the cell.

Length.—4.5 mm.

Habitat.—Shaohyling, China (Cornford).

Observations.—Very like the type, but differs in the abdominal ornamentation, black fork-scales on the head and white scales on the scutellum.

CULEX QUASIGELIDUS. n. sp.

(Plate XIII.)

Head brown, with narrow-curved grey scales and black upright forked ones; proboscis with a median pale band. Thorax with anterior two-thirds pale scaled, the front portion with reddish-brown shading into silvery white, the posterior third dark scaled. Abdomen with basal pale bands or unbanded. Legs brown, with the femora and tibiae with yellow spots; tarsi with narrow pale basal bands to some extent involving both sides of the joints, especially on the mid legs.

♀. Head brown, with narrow-curved pale scales and black upright fork-scales, except just in front, where they are ochraceous, scales at the sides of the head white, small and flat. Clypeus brown; palpi black, with a few white apical scales; proboscis black, with a narrow median pale band; antennae brown.

Thorax deep brown, with narrow-curved bright chestnut-brown scales in front, gradually becoming paler until they are pale silvery grey at about two-thirds across the mesonotum, where they end in an irregular line, the basal third of the mesothorax is covered with the same shaped deep brown scales and numerous black bristles; scutellum deep brown, with narrow curved pale scales and rich brown border-bristles; metanotum black; pleurae deep brown.

Abdomen variable, with or without banding, when banded the pale creamy bands are basal, the sixth segment with prominent white lateral basal spots, the seventh with the white scales extended down the side of the segment and with a few pale yellow median apical scales, the last segment with white basal scales; border-bristles bright golden yellow; venter dark brown, with basal pale lateral spots.

Legs brown, the bases of the femora and their venter pale, the apical dark portion with pale yellow spots; tibiae brown, with about ten pale spots; knees with golden tuft of hairs; the fore metatarsi and first three tarsi with basal pale bands, the mid with the tarsal bands involving both sides of the joints; the hind similarly banded, but the bands, although involving both sides of the joints, are mainly basal; ungues equal and simple.

Wings densely scaled, the third, the fourth, apical branches of the fifth with rather short broad median scales, the sixth with

narrow *Taeniorhynchus*-like scales; first sub-marginal cell longer and narrower than the second posterior cell, their bases about level, that of the former if anything slightly nearer the apex of the wing; its stem about one-half the length of the cell; stem



Fig. 95.

Wing of *Culex quasigelidus*. n. sp. ♀.

of the second posterior about one-half the length of the cell; posterior cross-vein nearly twice its own length from the mid cross-vein. Halteres with pale stem and fuscous knob.

Length.—4 mm.

♂. Thorax and legs as in the ♀, but the legs are darker and the spots more prominent. Palpi long and pointed, apex with a broad yellow band, and with four equidistant yellow bands below, with thick deep brown hairs on the two apical joints and down as far as the second pale spot from the base; antennae annulated with deep brown and pure white. Fork-cells both short; first sub-marginal longer and narrower than the second posterior cell, their bases about level, its stem not quite half the length of the cell; posterior cross-vein twice its own length distant from the mid; fore and mid ungues unequal and uniserrated; hind equal and simple.

Length.—5 mm.

Time of capture.—September.

Habitat.—Entebbe, Uganda.

Observations.—Described from two perfect ♀'s and one ♂. It comes very near *P. Durbanensis*, but can at once be told by its beautifully ornamented legs, the spots on the femora and tibiae being very characteristic and prominent. One specimen bred from the same locality and at the same time as the one described here has an unbanded abdomen, the last segment only bearing any trace of pale markings, there are no other differences, however. The ♂ has the legs rather darker than the ♀ and the spots more pronounced in consequence.

CULEX SECUTOR. Theobald.

(Mono. Culicid. II., p. 321, 1901.)

Notes.—Dr. Grabham sends the following notes on this species: "*C. secutor* is an inland species. Specimens have been sent to me from Castleton and Cinchona, 5000 feet altitude. Great numbers bred in the pools at the foot of the Red Hills, near Kingston, in the autumn of 1899, which was very wet and the pools abundant; since then I have not seen any. They differ much from all other forms in having a slow and clumsy flight, an unmistakable character, and they attack one persistently in dense clouds, following one about. They attack during the day."

CULEX JANITOR. n. sp.

(Plate X.)

Thorax deep brown, with rich brown narrow-curved scales, and with a slightly paler curved line on each side about the middle of the mesonotum (in some lights may be seen a median dark line, in others two median parallel lines); abdomen in the ♀ apparently unbanded, with small basal white lateral spots, venter with broad basal white bands. Fore and mid legs unbanded, hind with narrow bands, mostly basal, but to some extent involving both sides of the joints. Fork-cells rather short, their bases about level. In the ♂ there are basal white abdominal bands.

♀. Head deep brown, with narrow-curved creamy scales in the middle, darker at the sides and very pale yellow round the eyes, with numerous black upright forked scales; palpi rather long, black scaled, antennae and proboscis black, the latter pale at the apex; basal joint of antennae testaceous.

Thorax deep brown, with narrow-curved brown scales and black bristles, with a short paler scaled line running on to the mesonotum about its middle on each side: scutellum paler, with small narrow-curved pale scales and dark brown border-bristles; metanotum deep blackish brown.

Abdomen deep brown, with dull violet reflections, practically unbanded, but now and then showing a few grey basal scales to the segments, with small basal lateral white spots; venter with basal white bands.

Legs brown, fore and mid unbanded, coxae pale, also venter of femora; hind legs with pale knee spot and with narrow pale bands involving both sides of the joints; unguis equal and simple.

Wings with the first sub-marginal cell very little longer, but

narrower than the second posterior, their bases nearly level, that of the second posterior, if anything, nearer the base of the wing; stem of the first sub-marginal more than half the length of the cell; stem of the second posterior rather more than half the



Fig. 96.
Wing of *Culex janitor*, n. sp. ♀.

length of the cell; the mid cross-vein not quite joining the super-numerary, posterior cross-vein longer than the mid, nearly twice its own length distant from it. Halteres pale, with slightly darker knob.

Length.—5 mm.

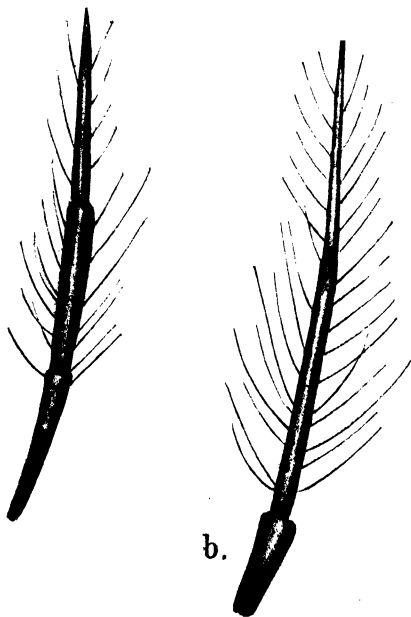


Fig. 97.
Apex of ♂ palpi in (a) *Culex janitor*, n. sp., and (b) *C. secutor*. Theobald.

♂. Palpi brown, with one narrow pale band towards the base, the two apical joints equal, both slightly paler at the base,

with a few short brown hairs on each side, also at the apex of antepenultimate joint; proboscis and antennal plumes brown, basal joint of antennae large, pale reddish-brown.

Thorax as in ♀, but rather brighter.

Abdomen with narrow pale bands on three of the basal segments, then two with large basal pale spots, not forming bands, and then a mass of dull grey scales on the apical segment; densely hairy. The banding in the hind legs is more distinct than in the ♀, especially at the tibio-metatarsal joint, and there are also traces of banding, mostly basal in the mid legs; fore and mid unguis unequal, uniserrated; hind equal and simple. Fork-cells small, stem of the first sub-marginal about two-thirds the length of the cell; stem of the second posterior cell nearly as long as the cell; posterior cross-vein about two and a half times its own length from the mid cross-vein. Halteres pallid with slightly fuscous knob.

Length.—5 mm.

Habitat.—Kingston, Jamaica (Dr. Grabham).

Observations.—Described from a series taken by Dr. Grabham. It bears a strong superficial resemblance to *Culex secutor*, but differs in having an unbanded abdomen in the ♀, in the structure of the ♂ palpi (fig. 97), the two apical joints being much shorter and rather stouter than in *C. secutor*.

The species are found congregated with *Deinocerites cancer* at the entrance to crab-holes by the sea-shore; they are by no means as numerous as *D. cancer* and never fly up and attack one, so are probably nocturnal like *D. cancer*. "I have never seen *C. secutor*," says Dr. Grabham, "in that locality, *C. secutor* being an inland species."

CULEX CINGULATUS. Fabricius.

(Mono. Culioid. II., p. 5, 1901.)

Regarding this species, Dr. Lutz writes me as follows: "I find now that they (*cingulatus*) always have the peculiar form of the first abdominal segment you describe in *C. cingulatus*, though sometimes it is not easily seen unless searched for, and this striking character separates them at once from *C. fatigans*. At first the two species may not seem very much alike, as *C. cingulatus* is somewhat smaller and darker, but the two species are both very variable and very much mixed up together, also similar in habit, and in somewhat worn specimens confusion is quite easy. *C. cingulatus* is by no means rare near habitations, and I have

sometimes bred it in large numbers. It is not so strictly nocturnal as *C. fatigans*.

Additional locality.—Para, Brazil (Dr. Durham).

♂♂♂. *Legs with two last hind tarsi white.*

CULEX ALBITARSIS. Theobald.

(Mono. Culicid. II., p. 25, 1901, Theobald (♂); Archives de Parasitologie, VI., p. 10, 1902, Neveu-Lemaire (♀) ?)

The following description is given by Neveu-Lemaire of the ♀ of this species:—

♀. This species was described by Theobald from a single example brought him from West Africa by Dr. Annett. The only specimen caught by Dr. Mathis in French Guiana was a female, of which I proceed to give a detailed description which will complete that of Theobald.

♀. The head is dark brown; the occiput is covered with small yellow scales, narrow and curved, of which some are bifurcated at their ends; on the sides the scales are flat and yellow, those on the front being darker. A light border is found about the eyes. The antennae, which measure 2·31 mm., are shorter than the proboscis; at the base of each joint are to be found verticillate hairs much longer than customary in females of the same genus. They are fawn or golden-yellow.

The maxillary palpi, shorter than a third of the proboscis, consist of three joints, the last being conical at its extremity. They are brown, darker at the end, completely and very closely covered with scales. The proboscis of a brownish-yellow, 2·79 mm. in length; the extremity, unlike the rest, is nearly black. Numerous very closely-set scales completely cover it.

The thorax is brown, covered with scales edged with golden-yellow; the median lobe (of the scutellum?) is darker than the remainder and has thin silk-like black narrow-curved scales that are also to be found on the mesothorax. The pleurae are brown, with masses of whitish scales. The wings, longer than the abdomen, show no spots caused by scaly accumulations, but their colour is darker in the neighbourhood of the costal vein, and this colour continues getting lighter towards the top and the marginal side, so that the greater part of the wing is transparent. The costal cell also is transparent at its base. The costal nerve and the fifth longitudinal nerve are darker than the others. The first sub-marginal and the second posterior cells are very small; the first sub-marginal is a little longer and narrower than the second posterior, but their base is at an equal distance from the base of the wing. The supernumerary and the middle cross-veins are a continuation of each other. The posterior cross-vein is long and distant about half its length from the mid cross-vein.

The legs are long and unbanded. The coxae yellowish, as are also the femora at their base. The base of the femora, the tibiae and the joints of the tarsi are dark brown. The apex of the third joint, the fourth and the

fifth joints of the tarsi of the last pair of legs are completely white; this is the most striking feature of the species. All dark parts are covered with abundant scales; the white parts are not coated with them. The claws are beautiful brown; those of the first pair are without, those of the others have each a tooth.

The abdomen is brown on the dorsal surface and covered with small white scales showing violet reflections at times. The bands and white spots described and drawn by Theobald in the ♂ do not seem to exist in the ♀, unless the long sojourn in alcohol has altered the colouring. The ventral surface is yellow, with a narrow black band at the extremity of the segments.

Length.—10 mm. (including proboscis).

Habitat.—Only example of a ♂ known comes from West Africa and was caught in July. The only female got up to the present was taken in January in the village of Counani, Guiana, by Dr. Mathis.

It is interesting that the two specimens of this species, the one ♂, the other ♀, have been collected in countries so differently situated, which should make one think that it has a fairly large area of distribution. It is true that ships may play an important rôle in the transportation of mosquitoes from one country to another.

Note.—I do not feel certain that this is the ♀ of my species. The scales being absent on the described white parts of the legs seems strange; in *albitarsis* the white part of the legs are densely scaled with white scales.—F. V. T.

Legs with femora and tibiae spotted or lined.

CULEX THEILERI. n. sp.

(Plate XI.)

Thorax deep brown, with reddish-golden narrow-curved scales, paler before the scutellum, showing two parallel bare median lines in front; pleurae pale testaceous, with grey scales. Proboscis unbanded. Abdomen covered with deep brown scales, with basal creamy-white triangular patches, the base extending across each segment, basal segment pale, with two small dark patches of scales. Legs unbanded, the femora and tibiae with thin rows of white scales; coxae and venter of femora pallid. Wings with typical *Culex* scales, transparent.

♀. Head brown, with narrow-curved creamy scales, brown in some lights, and with deep brown upright forked scales, scales around the eyes paler and with inwardly projecting brown bristles; proboscis deep brown, unbanded; palpi black, with some white patches, the apical joint long; antennae deep brown, basal

joint rich testaceous, with small creamy scales and also a few creamy scales on the second joint ; clypeus brown, large.

Thorax brown, with narrow-curved golden scales, paler before the scutellum, over the roots of the wings and a few at the sides, with two median parallel bare lines in front and with black and brown bristles ; the scutellum pale brown, with narrow-curved pale scales, like those in front of it ; " border-bristles " in two rows, the longer brown, the shorter grey ; metanotum brown ; pleurae pale brown and grey, with grey scales.

Abdomen brown, with basal white triangular spots, the base of the triangle spreading right across the base of the segments ; there are also white scales at the sides of the last three segments and traces on the others ; basal segment pallid, nude save for two small median spots of black scales, hairy ; venter mostly pale scaled.

Legs deep brown, coxae pallid, the femora and tibiae of all three pairs with prominent lines of white scales ; metatarsi and tarsi deep brown and unbanded ; the base and venter of the femora very pallid ; fore, mid and hind ungues equal and simple, black ; there are indistinct traces of linear white marks on the metatarsi as well.

Wings with typical brown *Culex* scales ; the first sub-marginal cell is much longer and narrower than the second posterior cell, its base is nearer the base of the wing than that of the second posterior, its stem about one-fourth the length of



Fig. 98.

Wing of *Culex Theileri*. ♀. n. sp.

the cell ; stem of the second posterior about half the length of the cell ; posterior cross-vein not quite its own length distant from the mid and rather longer ; the costal, first, third and fifth long veins darker than the rest. Halteres ochraceous, with pale knob scales.

Length.—5 to 5.5 mm.

♂. Palpi deep brown, with a narrow pale band towards the base, last joint acuminate, hair-tufts deep brown ; antennae

banded with deep brown and grey, plume-hairs deep brown; proboscis deep brown.

Thorax much as in the ♀.

Abdomen with basal white marks more as uniform bands and the lateral white scales prominent; genitalia very bristly.

Legs not so distinctly white lined as in the ♀; fore and mid unguis unequal, both uniserrated and black.

Wings with the first sub-marginal cell nearly half the length of the cell; stem of the second posterior cell nearly as long as the cell, the bases more level than in the ♀.

Length.—5 to 5.5 mm.

Time of capture.—March (Pretoria); October (Madeira).

Habitat.—Pretoria (Dr. Theiler); Madeira (Dr. Grabham).

Observations.—Described from a single perfect ♀ and an imperfect ♂ from the Transvaal. A number of specimens has also been recently sent by Dr. Grabham from Madeira. These show some considerable variation in regard to the abdominal banding. The spots and white lines on the legs also vary; in some we get rows of spots on the fore femora, in others complete lines. The lines are always more or less prominent, which renders its identification easy. *C. Creticus* is the only species it can be confused with.

CULEX CRETICUS. n. sp.

Head clothed with pale creamy scales in the middle, grey at the sides, ochraceous upright forked scales on the occiput, black ones laterally; proboscis coppery-brown; palpi black, white at apex. Thorax deep brown, densely clothed with rich golden-brown scales, paler at the sides and in front of the scutellum; pleurae pale brown, with some grey scales. Abdomen black, with basal triangular, irregular white patches, extending more or less irregularly down the segments, with narrow, apical, creamy borders, on the apical segments; the white scales are more abundant apically than basally; venter mostly white scaled. Legs black to bronzy, with a white scaled line ventrally.

♀. Head brown, with narrow-curved creamy scales, upright ochraceous forked scales in the middle and black ones at the sides, and then flat grey scales; proboscis thick, covered with bronzy scales; palpi black, with white scales apically and a few scattered over the whole of the palpi; antennae black, basal joint testaceous; clypeus black.

Thorax black, densely clothed with narrow-curved, rich golden-brown scales, paler at the sides and in front of the scutellum, almost grey in some lights; scutellum brown, with pale, narrow-curved scales and rich brown border-bristles; metanotum brown; pleurae rich reddish-brown, with patches of grey scales.

Abdomen black, clothed with large scales; each segment with a large basal creamy patch, more or less triangular, and extending mostly to the apical border of the segments, apical border with a narrow line of creamy scales, laterally the segments are white scaled, the last three segments have the ornamentation indistinct, the pale scales being mostly apical; venter black, with large creamy-white scales scattered over it.

Legs deep bronzy-brown, their ventral surface pure white, forming a more or less uniform white line; coxae white scaled; unguis large, black, equal and simple.

Wings with typical brown *Culex* scales, the first sub-marginal cell considerably longer and narrower than the second posterior cell, about four times as long as its stem; stem of the second posterior cell half as long as the cell, its base nearer the apex



Fig. 90.

Wing of *Culex Creticus*. ♀. n. sp.

of the wing than that of the first sub-marginal; posterior cross-vein longer than the mid, about two-thirds of its own length distant from it; the first sub-marginal cell is long, its base being just past the junction of the sub-costal and costal veins. Halteres ochraceous.

Length.—6 mm.

Habitat.—Crete.

Observations.—Described from a single ♀ with complete scale structure. The species is very marked; the abdominal ornamentation, with its large and prominent scales, and the white

lined legs, will identify it at once. It might be mistaken for *C. Theileri*, but there is only one white line on the legs, a ventral one, and the abdomen is differently adorned.

♂♂♂♂. *Legs banded on the tibiae only.*

CULEX UNIVITTATUS. Theobald.

(Mono. Culicid. II., p. 29, 1902.)

Additional locality.—Lagos (Strachan).

aa. *Legs unbanded.*

CULEX SERRATUS. Theobald.

(Mono. Culicid. II., p. 45, 1902.)

Notes.—Common in jungle growth along coast of British Guiana.

Mr. C. W. Hewlett has taken it in August in Trinidad—so that it seems to occur over a considerable time and occurs in houses. Dr. Lassalle has shown me Trinidad specimens taken at Chaguanas.

CULEX CONFIRMATUS. Theobald.

(Mono. Culicid. II., p. 42, 1901.)

Additional localities.—Trinidad (Hewlett); British Guiana (Low); Para (Dr. Durham).

Notes.—Common in jungle growth along coast of British Guiana at Weldad and on the Pomeroon Canal.

CULEX LATERALIS. Meigen.

(Mono. Culicid. II., p. 51, 1901.)

Additional localities.—Source de l'Orbe, Canton Vaud, Switzerland, 10.8.1900, altitude, 2500 feet (A. E. Eaton); Algeria (Dr. Sergeant)?

Notes.—The Rev. A. E. Eaton has presented to the Museum a large handsome ♀, with purplish metallic hue to the hind legs and abdomen, taken in Switzerland. Another ♀ taken on the same date and at the same locality is not more than half the size. The larger specimen has the base and venter of the femora of a yellowish, not white hue, and answers to the

C. albopunctatus of Rondani, which would then have to sink as a synonym.

The Algerian specimen sent by Dr. Sergent exactly resembles the typical European form, but the pale thoracic scales are almost yellow instead of white.

CULEX ALBOLINEATUS. Giles.

(Handbk. of Gnats, 2nd ed., p. 490, 1902, Giles.)

Thorax deep brown, clothed with dull golden and a few pale bronzy scales, with two median black lines and traces of a curved lateral ones. Proboscis black, unbanded. Abdomen dusky-black, the segments with basal creamy bands, a paler median line runs down the centre of the abdomen; pale ventrally. Legs brown, unbanded, pale at the base and ventrally.

♀. Head brown, with narrow-curved pale golden to creamy scales, paler round the eyes and with numerous upright dark brown forked scales, a few rich ochraceous ones in the middle; clypeus, palpi, proboscis and antennae deep blackish-brown.

Thorax deep brown, covered with narrow-curved dull golden scales and some of a pale bronzy hue, showing two median parallel bare dark lines and traces of a curved dark line on each side of them; the scales are paler in front of the scutellum; scutellum pale brown, with pallid narrow-curved scales and nine rich brown bristles to the mid lobe; metanotum chestnut-brown; pleurae pale greyish-brown.

Abdomen dusky-black, with narrow basal pale creamy to white bands and narrower ochraceous apical ones, the middle of the segments with pale ochraceous scales, forming a more or less distinct pale median line; venter densely clothed with grey scales.

Legs brown, unbanded, bases and venter of femora as well as the coxae very pale ochraceous; ungues equal and simple, deep brown.

Wings with long brown typical *Culex* scales, fork-cells rather long, the first sub-marginal considerably longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem less than one-third the length of the cell; stem of the second posterior more than half the length of the cell; posterior cross-vein about three times its own length distant from the mid cross-vein. Halteres pale ochraceous, with pallid scales.

Length.—5.5 mm.

Habitat.—Shahjahanpur, North-Western Provinces, India (Giles).

Time of capture.—October 20th.

Observations.—Re-described from Colonel Giles's type. It is a very distinct typical *Culex*, easily told by the pale line down the centre of the abdomen and the basal and minute apical pale banding.

CULEX NIGRIPES. Zetterstedt.

(Mono. Culicid. II., p. 93, 1901.)

Notes on synonymy.—*C. incidens*, Thomson, is not this species, but quite distinct. Probably a good many localities given for *nigripes* (*impiger*) in America are wrong. It is essentially a northern mosquito; nothing like it has occurred in the West Indies amongst the large collections I have examined from the different islands (*vide* Howard's "Mosquitoes," p. 80).

The hind ungues of the ♀ are uniserrated and the thorax is adorned in good specimens. The second posterior cell is wider than in *C. Terriei*.

CULEX TERRIEI. n. sp.

Thorax deep brown, clothed with golden-brown scales; the head, palpi and proboscis black; abdomen deep brown, with basal white bands and a few pale scales scattered over the surface, last two segments mostly pale scaled. Legs brown, mottled with pale scales, knee spot yellow. Wings with the costa, sub-costal, first long vein, and the base with creamy scales scattered amongst the brown, rest of vein with dense long brown scales.

♀. Head dark brown, clothed with yellowish narrow-curved scales above, with yellow upright forked scales and paler flat lateral scales; there are also some black upright forked scales at the back and sides and some black forwardly projecting bristles over the eyes. Palpi black, with a few creamy scales; *proboscis black, with a few creamy and golden scales at the base*; antennae black, with a few small yellowish scales on the inside of the basal joint. Thorax black, covered with narrow-curved golden scales, which become paler, almost creamy over the wings and in front of the scutellum; scutellum brown, with narrow-curved pale scales and six large median bristles to the mid lobe; pleurae with white scales.

Abdomen black, with black scales and basal white bands a few pale scales on the apical borders of the segments, pale scales on the first, and scattered over the second and last two apical segments; venter mostly pale scaled, with black lateral median patches.

Legs brown, pale yellow towards base and beneath the femora; femora and tibiae mottled with yellowish-white scales, also the metatarsi, tarsi unbanded; unguis of all the legs equal and unserrated; the apex of the femora is creamy white on all the legs.

Wings with typical brown *Culex* scales, but the costa, subcostal and bases of the veins mottled with white scales as well; first sub-marginal cell longer and narrower than the second posterior, its stem equal to two-thirds the length of the cell, its base slightly nearer the base of the wing; stem of the second posterior also equal to about two-thirds the length of the cell; posterior cross-vein not quite its own length distant from the mid cross-vein; halteres clothed with grey scales.

Length.—4·3 mm.

Habitat.—Dartford, Kent.

Time of capture.—October.

Observations.—Very closely related to *C. nigripes*, but differs in the pale scaled area at the base of the proboscis, in the markedly speckled legs and costal border.

A single ♀ only so far taken by Mr. Terry, which flew to him with evident intent to suck blood.

CULEX SYLVAE. Theobald.

(Mono. Culicid. II., p. 96.)

This is, I feel sure, not a variety of *C. nigripes*, but a distinct species. The hind unguis are equal and simple.

CULEX PALUS. n. sp.

Thorax reddish-brown, with traces of dusky lines; pleurae ochraceous. Abdomen dusky-brown, with narrow basal grey bands, last segment unbanded; venter grey. Legs brown, unbanded; venter and base of femora grey; knee-spot and apex of hind tibiae grey. Wings of ♀ with similar venation to *fatigans*. Male palpi black; traces of one pale basal band only.

♀. Head brown, with very small narrow-curved dull golden scales and black upright forked scales on the occiput, small flat

greyish-white ones on the sides of the head ; antennae, palpi, and proboscis deep brown, the palpi with short pale golden hairs.

Thorax reddish-brown, with scanty small bronzy-brown, thin narrow-curved scales and dark brown bristles, which show more or less clearly in lines ; scutellum paler brown, with thin narrow curved bronzy-brown scales ; metanotum deep chestnut-brown ; pleurae pale, ashy-grey.

Abdomen pallid, covered more or less scantily with flat dusky-brown scales, narrow basal bands of white scales and brown border-bristles, the last two segments with the banding not so prominent ; the basal white-scaled bands look more prominent than they really are, owing to the few scales present allowing the pale integument to shine through ; venter pallid.

Legs brown ; coxae, base, and venter of femora pale grey ; the knee-spot and tibio-metatarsal joint pale, owing to an absence of scales ; unguis small, equal and simple.

Wings with typical brown *Culex* scales ; first sub-marginal cell longer and narrower than the second posterior cell, its base a little nearer the base of the wing, the cell about two and a half times the length of the stem ; second posterior cell about one and a half times the length of its stem ; posterior cross-vein about two and a half times its own length distant from the mid. Halteres pale ochraceous.

Length.—3 to 3.7 mm.

♂. Darker than the ♀. Palpi brown ; apical joints deep black, with black hairs, a trace of pale banding on the antepenultimate segment.

Antennae with deep brown plume-hairs ; proboscis brown, with long brown hairs beneath about the middle of its length.

Thorax as in the ♀ ; metanotum and pleurae pale.

Abdomen deep blackish-brown, with five prominent basal white bands, the last two spreading out laterally.

Legs brown ; coxae, venter of femora, and their base pale grey ; a prominent yellow spot at the tibio-metatarsal joint ; fore and mid unguis unequal, both uniserrated ; the tooth of the larger in the fore pair much bent downwards.



Fig. 100.
Culex palus. n. sp.
Fore and mid unguis of ♂.

Wings with the first sub-marginal cell longer and narrower than the second posterior cell, their bases nearly level; stem of the former equal to nearly half the length of the cell, stem of the latter nearly as long as the cell; posterior cross-vein not quite twice its own length distant from the mid cross-vein; scales on the branches of the first fork-cell rather thick.

Length.—3·5 to 4 mm.

Habitat.—St. Vincent, Barbados (Dr. Low).

Time of appearance.—June (Barbados).

Observations.—Described from a single female and several males bred by Dr. Low. The larvae were obtained in a swamp at Barbados, and in a marsh behind Kingstown, St. Vincent. It is a very small delicate *Culex*, very like *C. nigrutilus*, Zetterstedt, but clearly distinct, yet by means of a hand-lens the only difference is seen in the ♂ palpi of *nigrutilus* being banded with two bands. The scale structure of the thorax is, however, different: in this species the scales are very thin, narrow, and curved, and deep bronzy-brown.

CULEX BILINEATUS. n. sp.

Head brown, darker at the sides, with a narrow pale border round the eyes. Thorax brown, with paler dull golden ornamentation and two black bare parallel median lines slightly expanded in front; the pale scales occur in front between these lines, as two irregular spots on the dorsum and on each side in front. Legs long, dark brown, unbanded. Abdomen with traces of banding on the second to fourth segments in the ♀, and with white basal lateral spots, which show dorsally on the last two segments; in the ♂ all the segments basally pale banded.

♀. Head dark brown, with brown narrow-curved scales, a few grey ones especially in the middle, where a distinct median parting occurs, numerous black upright forked scales behind, and pale scales forming a narrow border round the eyes; proboscis dark brown; palpi dark brown, rather densely scaled, with a small apical joint and a long penultimate joint; antennae dark brown, basal joint bright testaceous, dusky on the inside, second joint slightly swollen, testaceous at the base; clypeus dark brown, with an apparent transverse sulcus.

Thorax dark brown, with very narrow curved brown and pale dull golden scales, with two black nude parallel lines, slightly widening in front, with three prominent rows of long dark bristles, one between the two parallel nude lines, and very

numerous long bristles over the roots of the wings and at the sides; the paler ornamentation is as follows: Pale scales between the two bare lines in front, and around the front of the mesothorax; two round irregular spot-like patches about the middle of the mesonotum, extending backwards as two lines; a pale patch over the root of the wings, and other pale scales at the sides of the mesothorax, and also around the bare space in front of the scutellum. Scutellum testaceous, brown at the sides, with pale narrow-curved scales, with apparently seven (?) very long brown median bristles; metanotum dark brown; pleurae brown, with patches of dull white scales.

Abdomen blackish-brown, with violet reflections, the first segment dark, the second to fourth (only) with traces of basal pale banding, all the segments with basal white lateral spots, which show on the dorsum of the last two segments; posterior border-bristles very pale, apex of abdomen bristly; venter with distinct grey basal bands.

Legs deep brown, bases and venter of femora grey, a small pale knee spot; unguis of the fore and mid legs equal, unserrated, rather small, of the hind legs equal, curved and simple.

Wings with the veins covered with typical brown *Culex* scales, venation much as in *Culex pipiens*; the first sub-marginal cell being considerably longer and narrower than the second posterior cell, its stem very short, about one-sixth the length of the cell or less; stem of the second posterior about two-thirds the length of the cell; posterior cross-vein about twice its own length distant from the mid; the first, third, and fifth veins darker scaled than the rest.

Halteres with dull grey stem and slightly fuscous knob.

Length.—5.5 mm.

♂. Thorax as in the female. Abdomen with distinct basal white bands, which spread out laterally on the penultimate and antepenultimate segments. Palpi thin, acuminate, longer than the proboscis, dark brown, with a narrow pale band on the basal half of the antepenultimate joint, the apical joint about the same length as the penultimate, both with scanty long black hairs, also the apex of the antepenultimate on one side; proboscis dark brown; antennae banded brown and white; plume-hairs dark brown; unguis of the fore and mid legs unequal, unserrated, of the hind small, equal and simple.

Length.—4.8 mm.

Habitat.—Brazil (Dr. Lutz).

Observations.—Described from a single perfect ♂ and ♀ sent me by Dr. Lutz. It is a very distinct species, easily told by the marked thoracic ornamentation. The wing venation is strikingly like *Culex pipiens*. The abdominal ornamentation is also peculiar in the ♀.

The types I have deposited in the British Museum (Nat. History).

CULEX VARIOANNULATUS. n. sp.

Thorax clothed with golden-brown narrow-curved scales, placed with the hairs so as to give a faint linear ornamentation. Abdomen deep brown, the third, fourth and fifth segments with basal pale bands and sometimes the second, and the rest unbanded. Legs unbanded, deep brown, coxae and femora greyish beneath; knee spot white. Wings with typical *Culex* scales.

♀. Head brown, with narrow-curved, creamy scales and brownish-black upright forked scales, small, flat, grey ones at the

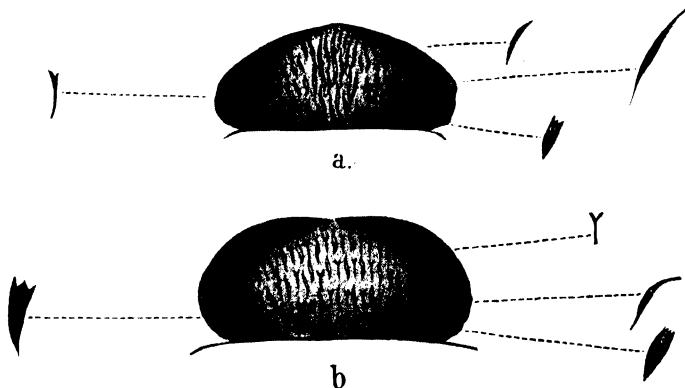


Fig. 101.

Heads of, a, *Culex Azoriensis*; b, *C. varioannulatus*.

sides; palpi, proboscis, and clypeus black; antennae brown, almost black.

Thorax deep brown, with dull, golden-brown narrow-curved scales and rows of black bristles; scutellum paler brown, almost grey in one specimen, with eight large border-bristles and several smaller ones; metanotum pale brown; pleurae pale brown and frosty grey.

Abdomen almost black, the fourth, fifth and sixth segments with a creamy basal band, a few basal white scales on the third, remainder unbanded; posterior border-bristles pale; venter almost entirely clothed with creamy scales.

Legs deep brown, unbanded, the coxae and venter of femora pale, unguis small, equal and simple.

Wings with the costa, first long vein, third and lower part of the fifth black, other veins brown; first sub-marginal cell longer and narrower than the second posterior, its base considerably nearer the base of the wing, its stem rather less than one-third the length of the cell; stem of the second posterior more than half the length of the cell; posterior cross-vein nearly twice its own length distant from the mid. Halteres testaceous, with slightly fuscous knob.

Length.—4 mm.

Habitat.—St. Michaels, Azores (Dr. Grabham).

Time of capture.—22.9.02.

Observations.—Very closely related to *C. Azoriensis*. The abdomen has three or four prominent pale basal bands, and there are no long curved scales in the middle of the occiput. The venation is much as in *C. Azoriensis*. Described from a series taken by Dr. Grabham in the Azores. I am not certain of its male, so have not described it. It is very close to *C. fatigans*, but I feel sure distinct; the last few segments of apex never being banded.



Fig. 102.

Culex varioannulatus (♀).

CULEX PEREXIGUUS. n. sp.

Thorax brown, covered with narrow-curved golden-brown scales in the middle, almost white ones at the sides and behind. Abdomen dark violet-brown, with narrow basal white bands. Legs dark brown, unbanded, bases and venter of femora paler; knee spot indistinct.

♀. Head dark brown, with small narrow-curved brown and golden scales above, almost white along the border of the eyes, and with small flat white lateral ones; a white tuft of hairs projecting between the eyes; antennae deep brown, basal joint testaceous brown, and also the base of the second joint, basal joint with small flat white scales; palpi black, with a few grey apical and basal scales; proboscis black.

Thorax brown, with pale reflections when denuded, covered with small narrow-curved golden-brown scales in the middle, with grey ones laterally, and almost white ones behind; scutellum testaceous, with narrow-curved grey scales, and seven median border-bristles; metanotum chestnut-brown; pleurae dark-brown, with patches of white scales.

Abdomen covered with brown to black scales with dull violet reflections; with basal white bands; border-bristles very thin and pale.

Legs dark brown, unbanded, bases and venter of the femora very pale grey, knee spot indistinctly yellow, apex of the tibiae with a dull white spot; unguis very small, equal and simple; in some lights the legs have a metallic ochraceous hue.

Wings with the veins covered with typical brown *Culex* scales; first sub-marginal cell a little longer and very slightly narrower than the second posterior cell, their bases about level; stem of the first sub-marginal not quite half the length of the cell; stem of the second posterior cell about two-thirds the length of the cell; posterior cross-vein more than twice its own length distant from the mid cross-vein; the fourth long vein somewhat bent just past the posterior cross-vein; the costal, sub-costal, first, third, and sixth long veins very dark brown. Halteres ochraceous, with slightly fuscous knob.

Length.—3 mm.

♂. Palpi with the last two joints and the apex of the antepenultimate dark brown, remainder pale brown, the last two joints and the apex of the antepenultimate with black hairs; longer than the proboscis by the apical joint and half the penultimate; antennae banded brown and grey, with deep brown plumes.

Fore and mid unguis unequal, both uniserrated, hind equal and simple. Fork-cells small, the first sub-marginal longer and narrower than the second posterior cell, their bases nearly level; the stem of the first sub-marginal nearly as long as the cell; posterior cross-vein about twice its own length distant from the mid.

Length.—3 mm.

Time of capture.—June (13.6.01).

Habitat.—Sidon, Palestine (Cropper).

Observations.—Described from a ♂ and ♀ given me by the collector, Dr. Cropper. It is a small, delicate mosquito, resembling to some extent *Culex nigritulus*, Zetterstedt, but the basal white

abdominal banding and the white tibial spot readily separate it. It also answers in some ways to Meigen's *Culex striticus*; but the thorax, although partly denuded, shows definite ornamentation, and there are no lateral abdominal spots, and the posterior cross-vein in the Palestine species is much further back than in the type of *C. striticus* in the Jardin des Plantes.

I have placed the types in the British Museum collection.

CULEX NIGRITULUS. Zetterstedt.

(Mono. Culicid. II., p. 140, 1901.)

Additional locality.—Crete.

Note on the ♂ genitalia.—The male *genitalia* (fig. 103) is very marked; the claspers are broad and sickle-shaped and have a twisted terminal process, the internal lateral processes consist of two large spines and a group of small ones, and in addition a lamelliform process shaped much like a dipterous wing.

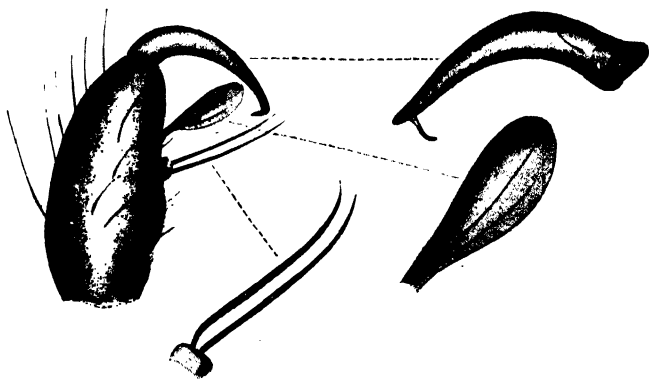


Fig. 103.

Culex nigrutilus, Zetterstedt.
♂ genitalia (Crete).

General notes.—A large series has been sent from Crete per Colonel David Bruce. They resemble in all respects the specimens I found in my garden in England, which I identified as *C. nigrutilus*, Zett., except that in the ♂ there is only one pale band to the palpi, and in both sexes the venter is mainly pale scaled. I cannot, however, separate the Cretan specimens from the British by any structural peculiarity, unless the ♂ *genitalia*

differs; unfortunately this was not examined in the English specimens. The pleurae of this species readily reflect any colour near them, those sent in pink-lined pill boxes had decided pink pleurae when pinned in the boxes.

CULEX CYLINDRICUS. n. sp.

(Plates IX. and XII.)

Thorax clothed with pale dull golden narrow-curved scales, unadorned. Abdomen black, narrow cylindrical, with six basal white bands, apex truncated. Legs blackish-brown, unbanded.

♀. Head brown, clothed in the middle with narrow-curved dull yellow scales, black at the sides and with a few flat white scales laterally, numerous narrow upright forked scales of a pale brown hue; palpi densely scaled with dark brown scales, with some long brown hairs; antennae brown; proboscis black, expanded apically.

Thorax dark brown, when denuded, clothed with silky dull golden narrow-curved scales, and with two lateral rows of black bristles, numerous black bristles over the roots of the wings; scutellum pale brown (almost testaceous when denuded) with narrow-curved pale scales and dark brown border-bristles, six large ones to the mid lobe and a posterior row of several very fine hairs; pleurae slaty-grey and brown or bright brown with a few brown bristles and white scales. Metanotum deep brown.

Abdomen narrow, cylindrical, slightly expanded apically and truncated, black, covered with black scales, the second to seventh segments with basal white bands, the scales rather more numerous in the middle of the segments, thus giving the bands a curved outline; first segment testaceous with two median patches of dusky scales and numerous long brown hairs, apical segment black, bristly; the antepenultimate segment rather expanded apically.

Legs with pale brown coxae and trochanters almost grey in some specimens, testaceous in others; remainder of legs deep brown, almost black, with bristles on the tibiae and metatarsi; hind metatarsi about the same length as the hind tibiae; unguis very small, equal and simple.

Wings with typical *Culex* scales; scales brown; fork-cells rather short; the first sub-marginal cell longer and slightly narrower than the second posterior cell, its base just a little nearer the base of the wing than that of the second posterior cell or level with it; its stem about half the length of the cell;

stem of the second posterior cell nearly two-thirds the length of the cell ; posterior cross-vein longer than the mid cross-vein, about twice its own length distant from the mid ; the scales on



Fig. 104.

Culex cylindricus. ♀. n. sp.

Wing scales.



Fig. 105.

Wing of *Culex cylindricus*. ♀. n. sp.

the sub-costal and first longitudinal are broader and denser than on the rest of the veins ; halteres with yellowish stem and fuscous knob.

Length.—4 to 4·3 mm.

♂. Palpi (fig. 106) brown unbanded, the last two joints with scanty brown hairs on both sides, the two apical joints being darker than the remainder of the palpi ; antennae banded brown and white, with flaxen brown plumes ; proboscis black, expanded apically ; thorax as in the ♀ ; abdomen not so cylindrical as the ♀, slightly expanded apically, with six basal white bands as in the ♀, apical segment black ; segments with pale brown hairs laterally ; in certain lights the abdomen has a violet hue ; apical segment truncated and bristly as in the ♀ ; posterior border-bristles rich brown, shorter in the middle than at the sides ; genitalia (fig. 107) with a spine-like process near the apex of the claspers ; the lateral process of the basal lobe spined, with an

apical tuft of bristles, a broad sword-like plate and two long chitinous processes curved at their apices.

Legs dark brown to black unbanded; fore unguis unequal, the larger not very long, rather thick, uniserrated, curved; the smaller more or less straight, curved at the tip, with a small



Fig. 106.

Culex cylindricus. n. sp.
♂ palp and proboscis.

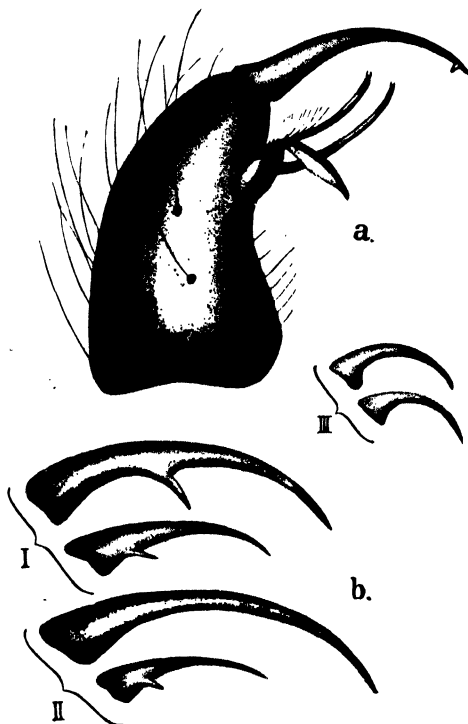


Fig. 107.

Culex cylindricus. n. sp.
a, ♂ genitalia (one half); b, I, II, and III, fore, mid,
and hind unguis.

tooth towards its base; mid unguis very unequal, the larger curved, acute, simple, the smaller rather more than half its length, straighter, and with a very small tooth near the base; hind unguis very small, equal, sickle-shaped and simple.

Length.—4 to 4.5 mm.

Time of capture.—January (15 and 18.1.01).

Habitat.—South Queensland (Bancroft).

Observations.—Described from a series sent me by Dr. Bancroft. It is a very marked species, easily told from all other mosquitoes of the genus *Culex* I have seen by the narrow cylindrical abdomen in the female and its truncated apex. The six white bands are also very characteristic. In the ♂ the unguis present very marked characters and the six white abdominal bands are also very pronounced characters. I cannot identify these insects with any of Skuse's Australian species, two or three of which I have still been unable to find in any collection sent either to the British Museum or to myself. The larvae of this species, like many Queensland mosquitoes, can live in salt water. One specimen bears on the label, "Larvae in salt water of sp. gr. 1050."

I have placed the types of this species in the British Museum collection.

CULEX SAGAX. Skuse.

(Mono. Culicid. II., p. 87, 1901, Theobald.)

♀. Head brown covered with narrow-curved pale golden scales, and ochraceous upright forked scales in the middle, a few black ones on each side, and a patch of flat white scales on each side; antennae black, basal joint bright testaceous, with a few pale scales; proboscis black; clypeus nude, black; palpi black scaled, a few pale ones at the apex.

Thorax deep brown, with rich golden-brown and pale, almost white, narrow-curved scales; fresh specimens show some ornamentation as follows: Two more or less distinct paler scaled parallel median lines in front ending before they get to the scutellum in a patch of very pale, often almost white scales, a narrow pale scaled line on each side of these on the posterior half of the mesothorax and traces of a still shorter one on each side over the base of the wings; scales in front of the scutellum pale; three rows of blackish bristles, the median ending before the scutellum; scutellum clothed with pale scales, almost white in some specimens; metanotum chestnut-brown; pleurae brown, with patches of pale scales.

Abdomen black (the scales having violet reflections), with basal irregular pale ochraceous to grey bands; rather hairy, the lateral hairs long; venter pale ochraceous, with traces of darker scaled median spots.

Legs deep brown unbanded, the bases and venter of the femora paler, apices of hind femora and tibiae pale yellowish;

hind tibiae about one-third longer than the hind metatarsi; ungues equal and simple, moderately curved.

Wings with typical brown *Culex* scales; the first sub-marginal cell a little longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem about one-third the length of the cell; stem of the second posterior about two-thirds the length of the cell; posterior cross-vein rather longer than the mid, about its own length distant from it; halteres ochraceous, with a faintly fuscous tinge to the knob.

Length.—5 mm.

Habitat.—Jenolan Caves, New South Wales (Dr. Bancroft); Murrumbidgee, New South Wales (Skuse); Bupengary, South Queensland (Bancroft); Condobolin, N.S.W. (Froggatt).

Time of capture.—October and November.

Observations.—Four ♀'s have been sent by Dr. Bancroft from New South Wales which are undoubtedly the species Skuse described as *Culex sagax*. His description applies exactly except for a slight difference in the relative lengths of the fork-cells. Skuse says "the first sub-marginal is scarcely longer and much narrower than the second posterior." In the specimens I have examined it is decidedly longer. Again, he says, "the middle rather longer than the posterior transverse vein, placed rather less than the length of the latter in front of it." In the specimens I have examined the posterior is quite its own length distant from the mid. These minor differences, I think, need not be considered, as it is almost impossible to say the exact relative lengths and distances of the veins in the wings unless they are mounted flat and measurements made, and even then in some specimens there is considerable variation. In the present species the thorax is evidently subject to variation; in one specimen from which this description is compiled the thorax is distinctly ornamented, in others it is scarcely so, but in all there are pale scales on and before the scutellum.

The male is described in Vol. II., p. 87.

CULEX PERVIGILANS. Bergroth.

(Mono. Culicid. II., p. 88, 1901.)

Additional localities.—Janolan Caves, New South Wales (Froggatt); South Queensland (Bancroft).

Note.—The fork-cells of the Australian specimens seem to be relatively longer than the New Zealand specimens, but they are undoubtedly the same species.

CULEX SIMILIS. n. sp.

Thorax reddish-brown, with very minute dull golden brown and a few black scales, and three double rows of black bristles; pleurae pale ochraceous; metanotum pale. Abdomen deep brown, with narrow pale basal bands, which on the last three segments spread out laterally. Legs deep brown, unbanded, coxae and venter of femora pale; unguis small, equal and simple. Wings with typical *Culex* scales; stem of the first sub-marginal nearly half the length of the cell.

♀. Head brown, covered with narrow-curved very pale creamy scales and flat lateral ones and with numerous black upright forked scales; antennae deep brown, with brown verticils and pale pubescence, basal joint and base of the second joint pale testaceous; palpi deep brown; proboscis deep brown, apex testaceous.

Thorax reddish-brown, scantily clothed with very small curved hair-like scales of a dull golden-brown to bronzy hue and a few scattered blackish ones, with three rows of black bristles, the median one double; metanotum pale ochraceous brown; scutellum pale brown, with a few minute black hair-like scales and seven deep brown border-bristles to the mid lobe; pleurae nude, pale ochraceous, with a few black and pale bristles.

Abdomen deep brown, with basal pale bands which spread out laterally on the last few segments; first segment fuscous with two median patches of black scales; posterior border-bristles pale. Legs deep brown, with dull violet reflections, coxae and venter of femora pale, the fore femora rather swollen; apex of femora and tibiae with traces of pale spots; unguis small, equal and simple.

Wings with rather dense typical brown *Culex* scales; costal border deeper brown than the rest of the wing; first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem not quite half the length of the cell; stem of the second posterior cell as long as the cell; posterior cross-vein about its own length distant from the mid-cross vein; fringe brown; halteres pale ochraceous, slightly darker at the top.

Length.—5 mm.

Habitat.—Jamaica (Dr. Grabham).

Time of capture.—March (2.3.02).

Observations.—Described from a single perfect ♀ taken in the Red Hills, Kingston, by Dr. Grabham.

It is closely related to *C. flavipes*, Macquart, but can be told from it by the absence of the two thoracic lines and by the longer stem to the first sub-marginal cell. From *C. fatigans*, which it also superficially resembles, it can at once be told by the minute hair-like curved thoracic scales. It comes near the African *Culex masculus*, Theobald, in the table (Vol. II., p. 118), having an unadorned thorax, to which it is also closely related, but separated again by the minute thoracic scales.

CULEX NUBILUS. n. sp.

Head, thorax, abdomen and legs deep dusky brown; the abdomen with basal lateral dull creamy spots and dull creamy venter; thorax with small bronzy-brown scales. Legs and proboscis unbanded.

♀. Head dusky brown, with dusky narrow-curved scales behind, deep ochraceous ones in the middle in front and pale ochraceous ones around the eyes, black upright forked scales at the sides and behind, ochraceous ones in the middle in front;



Fig. 108.

Culex nubilus. n. sp. (♀.)

a, Base of antennae; b, ♀ fore unguis.

proboscis and palpi deep brown, the latter rather thick; antennae deep brown, except the basal joint and base of the second joint, which are bright testaceous, basal joint with black bristle-like hairs on the inside.

Thorax deep dusky brown, with narrow-curved scattered bronzy scales, with numerous black bristles in front and a few over the roots of the wings; scutellum brown, with numerous large and small border-bristles to the mid lobe; metanotum brown; pleurae brown, with patches of grey scales. Abdomen entirely covered with dusky-black scales, the segments with more or less marked yellowish-grey basal lateral spots; border-bristles

dusky ; venter with dull creamy grey scales and traces of dusky apical bands. Legs entirely brown, except the coxae and bases of the femora, which are pallid grey ; unguis large, equal, all three pairs with a very large tooth.

Wings very slightly brown, with typical brown *Culex* scales ; the fork-cells short ; the first sub-marginal a little longer and narrower than the second posterior, its base about level with that of the latter, its stem about half the length of the cell ; stem of the second posterior about two-thirds the length of the cell ; posterior cross-vein longer than the mid, about two-thirds of its own length distant from it ; halteres with pale ochraceous stem and slightly fuscous knob.

Length.—5 to 6 mm.

Habitat.—British Guiana (Dr. Low).

Observations.—Described from five ♀'s. They were taken in the bush on the Pomeroon mission and on the Christianburg River. The species is very distinct and can at once be told by the bristly basal antennal joint, its general dusky-brown appearance and markedly serrated unguis. One specimen shows the brown proboscis very dark at the apex. It bears some resemblance to *Gilesia aculeata*, Theobald.

Dr. Low tells me it is a common forest species widely distributed in virgin forest in British Guiana.

CULEX CRINIFER. n. sp.

Head covered with creamy-grey scales, with a black patch on each side ; thorax deep rich brown on each side, with a broad median creamy area with two more or less parallel brown lines ; abdomen black, unbanded, with small white lateral basal spots. Legs black, unbanded ; coxae, base and venter of femora white. Wings with typical brown *Culex* scales.

♀. Head densely clothed with narrow-curved pale creamy scales and ochraceous upright forked scales ; there is a patch of black scales and black upright forked ones on each side, forming a distinct black lateral spot ; palpi and proboscis black ; antennae brown, basal and second joints testaceous, the basal joint with black bristles on the inside and the second joint with a few black scales.

Thorax black, with very thin narrow-curved bronzy-brown scales on each side, and a broad median creamy area with two very marked parallel dark lines covered with similar bronzy-brown

scales as the sides ; rather bristly, especially over the roots of the wings ; scutellum paler brown, with narrow-curved pale scales. metanotum chestnut-brown ; pleurae dark brown, with silvery-white puncta. Abdomen blackish, unbanded, with basal white lateral spots, which are very prominent ventrally, especially on the apical segments, the spots being more or less triangular in form, and pale border-bristles ; venter dark, with apparently basal white bands. Legs blackish-brown, coxae, venter and base of femora silvery white, knee spot pale ; femora, tibiae and metatarsi with pale bristles ; unguis of the fore, mid and hind legs equal, thick, uniserrated.

Wings with brown scales ; the first sub-marginal cell longer and narrower than the second posterior cell, its base very slightly the nearer of the two to the apex of the wing, its stem nearly



Fig. 109.
Wing of *Culex crinifer*. ♀. n. sp.

half the length of the cell ; stem of the second posterior about half the length of the cell ; posterior cross-vein about its own length distant from the mid cross-vein. Halteres pale, with a fuscous knob.

Length.—5 to 5.5 mm.

Habitat.—Sao Paulo (Dr. Lutz).

Observations.—Described from two specimens sent by Dr. Lütz, who proposed the name under which it is here described. It is a very marked species, easily told by its thoracic adornment.

CULEX AZORIENSIS. n. sp.

(Plate X.)

Thorax brown, with small narrow dull golden-brown scales and two median bare parallel lines in front. Abdomen deep brown above, unbanded, with basal lateral pale spots and pale venter. Legs deep brown, unbanded. Wings with the fork-cells as in *C. pipiens*. Palpi and proboscis deep brown, unbanded. *Head with long narrow-curved golden scales forming a median line.*

♀. Head (Fig. 101, a) brown, with curved dull pale golden-

brown scales, with a broad line of long paler ones in the middle, with numerous black, thin, upright forked scales and small flat grey ones at the sides; a slightly paler row of scales around the eyes; palpi, proboscis and clypeus black; antennae deep brown, basal joint and base of the second joint testaceous. Thorax deep brown, with small narrow-curved golden-brown scales and showing two dark bare median parallel lines in front, slightly expanding anteriorly, with black bristles, especially dense over the roots of the wings; scutellum paler brown, with narrow curved pale scales and eight brown bristles to the mid lobe; metanotum pale brown; pleurae pale brown and grey. Abdomen black, unbanded, with golden border-bristles and now and then traces of a few pale scales along the bases of the segments; there are also rather indistinct pale basal lateral spots, the apical segment with many ochraceous scales; venter all pale creamy. Legs deep brown, unbanded, venter of femora creamy-grey; knee spot faint; ungues small, equal and simple. Wings with the first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the latter; its stem less than one-fourth the length of



Fig. 110.

Wing of *Culex Azoriensis*. ♀. n. sp.

the cell; stem of the second posterior rather more than half the length of the cell; posterior cross-vein about one and a half times its length distant from the mid cross-vein. Halteres pale, with slightly darker knob.

Length.—4 mm.

♂. Palpi deep brown, with a narrow pale basal band; last two joints and one side of the apex of the antepenultimate joint with black hairs. Thorax, abdomen and legs as in the ♀. Fork-cells of wings moderately long. Ungues of fore and mid legs unequal; the larger uniserrated, the smaller (?).

Length.—4 mm.

Habitat.—St. Michaels, Azores.

Time of capture.—September.

Observations.—Described from a series collected by Dr. Graham. It comes very near *C. scholasticus*, Theobald, from the West Indies, but the ♂ palpi are hairy and they are not in this species and the median long scales over the head again separate it.

It might also be mistaken for Ficalbi's *C. modestus*, but the abdomen has not scanty yellowish speckling.

CULEX VIRIDIS. n. sp.

Entirely brown, with a pale patch on each side in front and the pleurae greenish-grey. Abdomen narrow and constricted at the waist in some specimens and delicate in both ♂ and ♀, paler at the base of each segment, giving a false banded appearance.

♀. Head brown, with narrow-curved grey scales, forming almost a white line around the eyes, the occiput with a few long pale upright forked scales; palpi, proboscis and antennae deep brown.

Thorax brown, with scattered narrow-curved brown scales paler in front of the scutellum and with a large grey patch on each side in front on the prothoracic lobes (the denuded surface showing darker brown longitudinal lines); scutellum paler brown to almost grey, with narrow-curved grey scales and six brown border-bristles to the mid-lobe; metanotum brown pleurae grey, with a dull greenish tinge and some small flat grey scales. Abdomen brown, unbanded, very narrow, the base narrower than the remainder, the last few apical segments with basal lateral grey patches and a few grey scales on the dorsum of the apical segment; venter pale ochraceous to grey, with apical dark bands.

Legs deep brown, unbanded, the hind femora grey on their basal half, other femora grey ventrally, coxae pallid; ungues



Fig. 111.

Wing of *Culex viridis*. ♀. n. sp.

small, equal and simple. Wings with brown scales; the first sub-marginal cell longer and narrower than the second posterior

cell, its base a little nearer the apex of the wing to nearly level with it, its stem less to more than half the length of the cell; stem of the second posterior more than half the length of the cell; posterior cross-vein longer than the mid, not quite its own length to twice its own length distant from it.

Halteres with an ochraceous stem and pale fuscous knob.

Length.—3·5 to 4 mm.

♂. Palpi deep brown, black at the apex, the last two joints of nearly equal length, with black hairs, and also a black hair tuft on one side of the apex of the antepenultimate joint; a very minute pale band may be detected towards the base of the palpi. Antennae and proboscis deep brown. Thorax, abdomen and legs as in the ♀; fore and mid unguis unequal, both unserrated,

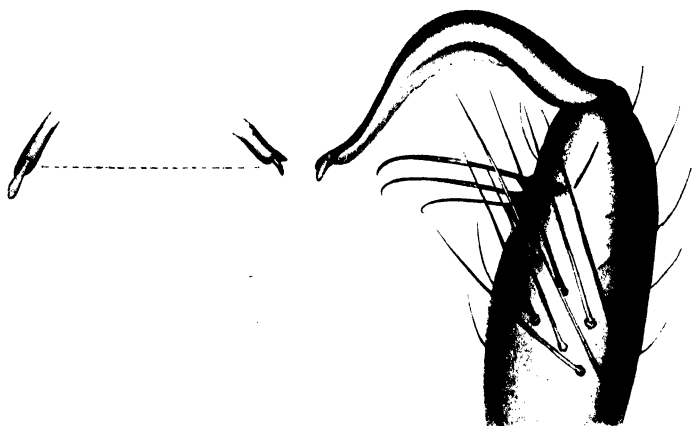


Fig. 112.

Culex viridis. n. sp.

♂ genitalia.

black; hind, small, equal and simple. Wings with the fork-cells small, the first sub-marginal longer and narrower than the second posterior, its stem half as long as the cell, its base about level with that of the second posterior, whose stem is about two-thirds the length of the cell. Halteres with pale stem and dusky knob. Claspers much curved (fig. 112).

Length.—3·5 to 4 mm.

Habitat.—Busé, Uganda (Dr. Low); Gambia (Dr. Dutton).

Time of capture.—October.

Observations.—Described from a perfect ♂ and ♀ bred by Dr. Low. It is a small delicate species somewhat resembling a

Melanoconion, but the apical wing scales as seen in the ♀ are not of the type found in that genus. The abdomen is peculiar in that the base is contracted, giving it a waist-like appearance in both sexes, but this is possibly due to shrinkage. The two pale patches, one on each side of the mesonotum, are also very characteristic, but vary in size and intensity; they are due to the prothoracic scales being pale. The abdomen presents a false banded appearance in some lights, the light basal bands being due to the light shining through the less scaled basal areas of the segments.

The forked scales on the head in the specimens taken at Entebbe are black and ochraceous, and the abdomen is not contracted basally to the same extent.

Dr. Dutton bred two ♀'s from larvae taken from pools at Box Bay, Gambia. The venation is slightly different, the relative length of the fork-cells varying considerably.

The larvae are emerald-green as well as the pupae. They may be found in pools of stagnant water. They are of large size than one would expect from the size of the insect.

CULEX CUMMINSH. n. sp.

(Plate XIII.)

Head deep brown, with narrow-curved, pale golden scales; palpi and proboscis deep brown, the former rather long. Thorax deep brown, with dense, narrow, hair-like golden scales; pleura white scaled. Abdomen brown, unbanded, with large basal white lateral spots. Legs deep brown, unbanded, paler at the base. Wings unspotted, with typical brown *Culex* scales.

♀. Head deep brown, with narrow-curved, pale golden scales and numerous long, black, upright forked scales, and small, flat, paler scales at the sides; palpi and proboscis deep brown, covered with blackish-brown scales; the palpi are moderately long and four-jointed, the second joint longer than the basal one, the third much the longest, and there is apparently a small fourth apical joint; clypeus deep brown; antennae deep brown, with pale pubescence and deep brown verticillate hairs; basal joint testaceous, with a few pale scales, second joint also testaceous at the base, with a few pale scales on the inside.

Thorax deep rich brown, covered with narrow, hair-like curved golden scales, with two small pale patches just in front of the scutellum; scutellum pale brown, with narrow-curved

creamy scales and long brown border-bristles ; metanotum brown, prothoracic lobes distinct, with narrow-curved, pale scales, with dense upwardly projecting brown bristles ; pleurae brown and

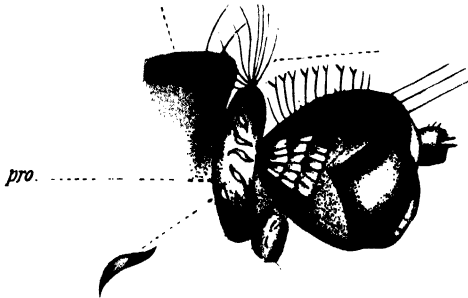


Fig. 113.
Head of *Culex Cumminsii*. ♀. n. sp.
pro, Prothoracic lobe.

leadon-grey, with numerous flat creamy-white scales and golden hairs.

Abdomen deep brown, unbanded, with large basal, white, lateral spots, the apical segment with a few white basal scales, ovipositor blackish ; posterior border-bristles golden ; venter paler than the dorsum, with ochraceous hue, with pale creamy scales and the apical borders of the segments dark.

Legs deep brown, coxae brown, base and venter of femora pale ; unguis of the fore and mid legs large, equal and uniserated, hind unguis absent.



Fig. 114.
Wing of *Culex Cumminsii*. ♀. n. sp.

Wings with the first sub-marginal cell considerably longer and a little narrower than the second posterior cell, its base a

little nearer the base of the wing, its stem equal to half the length of the cell, stem of the second posterior cell nearly as long as the cell; posterior cross-vein about half its own length distant from the mid cross-vein; scales on the sub-costal, first long vein and bases of the others rather broad and short. Halteres pallid

Length.—7 mm.

Habitat.—Bahr-el-Ghazal, Central Africa (Captain Cummins R.A.M.C.); Uganda (Drs. Low and Moffat).

Observations.—Described from a single ♀ sent by Captain Cummins in paper, but perfect except the ends of the hind legs. It is a large and handsome species, unlike anything else I have seen from Africa. Numerous specimens have also been recently sent from Uganda. When these are studied I fancy it can easily be removed from *Culex* (*sens. strict*).

CULEX INVIDIOSUS. Theobald.

(Mono. Culicid. II., p. 329, 1901.)

Additional localities.—Nigeria (A. H. Hanley), July and August, two ♀'s; Sierra Leone.

CULEX GENICULATUS. Olivier (1791).

Culex hortensis. Ficalbi (1889). (?)

(Encyclop. Méthodique, Hist. Naturelle, Insectes, T. 16, Olivier; Bull. Soc. Ent. Ital., p. 292 (*hortensis*), Ficalbi.)

Thorax dark brown, covered with narrow-curved pale mouse-coloured scales, showing traces of two median dark lines and traces of lateral lines—only seen in certain lights; palpi of the female dark brown, with a band of white scales in the middle. Abdomen deep blackish-brown, with narrow apical white bands. Legs blackish, with clear white knee spots; ungues of the ♀ all equal and simple; of the male, the fore and mid unequal, the larger uniserrated, hind equal and simple.

♀. Head brown, with pale narrow-curved scales almost white round the eyes, blackish upright forked scales and yellow bristles; proboscis black; palpi covered with black scales, with a median band of white scales; antennae black, basal joint and base of second joint partly testaceous, with white scales.

Thorax dark brown, covered with narrow-curved scales of a mouse colour, with three rows of black bristles, traces of two

median parallel dark lines and very indistinct lateral ones; scutellum paler, with narrow-curved pale scales, and with six bristles to the median lobe; metanotum chestnut-brown; pleurae brown, with numerous grey scales, almost white.

Abdomen banded black and white, the white bands are narrow and apical, on the second and third segments they are slightly expanded in the middle; basal segment paler, with median grey and a few dark scales; border-bristles and lateral ones prominent, very pale; venter white, with dark lateral patches.

Legs black, with deep violet reflections, unbanded; knee spot pure white, very distinct; coxae paler, with white scales, venter of femora pale; unguis dark brown, all equal and simple.

Wings with typical *Culex* scales, of pale brown colour; first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing than the base of the second posterior cell, its stem less than half the length of the cell; stem of the second posterior cell rather shorter than that of the former, a little less than half the length of the cell; posterior cross-vein not quite its own length distant from the mid cross-vein. Halteres pale.

Length.—7 to 8 mm.

♂. Palpi pointed, longer than the proboscis, black, with a median white band. Antennae black, with pale scales on the basal segments.

According to Ficalbi, in *hortensis* the fore and mid unguis are unequal, the larger one uniserrated; the hind pair small, equal and simple.

Length.—5 to 7 mm.

Time of capture.—July (Palestine).

Habitat.—Safed, Palestine (Cropper); Paris (Olivier and Robineau-Desvoidy); Italy (Ficalbi) (?).

Synonymy.—Olivier described in 1791 (article "Cousin. *Culex*"; Encyclop. Méthodique, Hist. Naturelle, Insectes. Tome sixième. Paris) a *Culex* under the name of *C. geniculatus*. The short description given applies to this insect in every detail. Although no mention is made of the banded palpi, such, however, would easily be overlooked in a cursory examination for such a short description.

Ficalbi's *C. hortensis* is the only European species that agrees with it, and I fancy it may be the same. Ficalbi's name, *hortensis*, would therefore sink as a synonym.

Observations.—A single ♀ of this very distinct mosquito was given me by Dr. Cropper, taken on a “hill-side” in Palestine. It answers in every detail to Ficalbi’s *Culex hortensis*, except that the scales at the base of the antennae are white, not light blue, nor are the scales on the pleurae and bases of the legs bluish white, but white to grey. The species is so very marked that no mistake can, however, be made, the white apical abdominal banding and the white band on the palpi being very characteristic. The difference seen in the antennal scales, and those on the pleurae, may point to *hortensis* being distinct.

Ficalbi says that *hortensis* does not attack man, nor enter habitations, but he believes subsists on the juices of plants.

CULEX SERGENTII. n. sp.

Thorax reddish-brown, with narrow-curved dull brown scales. Abdomen black, with narrow apical white bands and large white apical lateral patches continuous with the apical bands; venter entirely white-scaled; proboscis and palpi deep brown. Legs deep brown, unbanded, with small white knee spots, and grey base and venter to femora. Wings with rich brown scales.

♀. Head deep brown, covered densely with rather long narrow-curved creamy-white scales, deep brown upright forked scales and small rather long flat scales laterally, with some large black bristles projecting forwards over the eyes; palpi short, black-scaled; proboscis deep brown to black; antennae deep brown, basal joint and base of the second paler.

Thorax reddish-brown to deep reddish-brown, covered with narrow-curved brown scales, almost yellow around the front of the mesonotum, and some slightly paler ones in front of the scutellum, two more or less distinct median parallel bare lines with a line of black bristles between; prothoracic lobes with grey scales; scutellum pale brown, with narrow-curved pallid scales, and six brown border-bristles to the mid lobe; metanotum chestnut-brown; pleurae pale ochraceous, with three patches of white scales, one under the root of the wings.

Abdomen black, covered with black scales, with violet reflections, each segment (except the first) with a narrow apical border of white scales which spreads out laterally to form large apical white lateral spots; basal segment blackish, with two median patches of black scales, and long pale deep brown and

golden-brown hairs ; posterior borders of the segments with short deep brown hairs, and the sides of the abdomen with golden-brown hairs ; venter almost entirely covered with white scales.

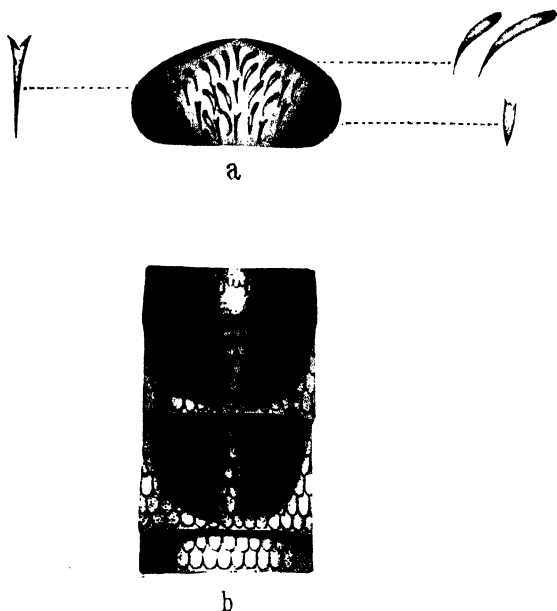


Fig. 115.

Culex Sergentii. n. sp.

a, Cephalic ornamentation ; b, basal segments of abdomen.

Legs deep brown ; coxae grey, also the base and venter of the femora ; knee spots small, white ; ungues brown, equal and simple.

Wings with typical deep brown *Culex* scales ; fork-cells rather short, first sub-marginal cell longer and narrower than the second posterior cell, its base slightly nearer the base of the wing than that of the second posterior cell, its stem not quite half the length of the cell ; stem of the second posterior cell nearly as long as the cell ; posterior cross-vein nearly twice its own length distant from the mid cross-vein ; the costal, first, third, and fifth long veins darker scaled than the rest ; border-scales of wing very dark, and sharply contrasted against the fringe.

Halteres with pale stem and brown knob.

Length.— 4 mm.

Habitat.—Algeria (Dr. Sergent).

Observations.—Described from a single ♀ sent me by Dr. Sergent in perfect condition, but full of blood, the abdomen being much distended, and, as usual under such circumstances, jet black. It is closely related to *Culex geniculatus*, Olivier, but differs in having no white scales on the palpi, in having a much longer stem to the second posterior cell, the posterior cross-vein being much further distant from the mid than in *C. geniculatus*, and in having the large expanded apical lateral white abdominal spots. From the swollen dark state of the insect it is evidently a blood-sucker.

CULEX MATHISI. Neveu-Lemaire.

(Archives de Parasitologie, VI., p. 13, 1902.)

The following is Dr. Neveu-Lemaire's description :—

Head brown; antennae longer than the proboscis in the ♀; maxillary palpi very small, much shorter than the third of the proboscis, and formed of three joints in the ♀. Thorax brown, with a longitudinal yellow line; the wings not extending farther than the abdomen, transparent, with a brown costal stripe less defined about the middle. Legs unbanded, covered with scales and hairs; unguis of ♀ all equal and uniserrated. Abdomen brown, the dorsal surface with yellow apical bands; ventral surface yellow, with black apical bands, lateral spots pale.

♀. Head brown; the occiput has a tuft of small yellow scales, straight and bifurcated at their extremity, a pale line around the eyes. The antennae are longer than the proboscis, and measure 2·48 mm.; they are fawn coloured, with paler spaces at the articulations. The maxillary palps are less than a third of the proboscis, they measure 0·37 mm.; they are formed of three joints, the third is longer than the two others and truncated at the end; they are fawn coloured, and clothed densely with scales and some hairs. The proboscis measures 2·21 mm.; it is brownish, and covered with flat scales. The thorax is brown, with a pale median longitudinal band on the dorsal surface, formed of little pale yellow narrow-curved scales. On the anterior portion are found two parallel dark lines, close together. On the posterior part are two similar lines, but longer and further apart than the others; the scutellum and the sides of the thorax are similarly coloured brown. The wings are not longer than the abdomen and not spotted, but have a dark costal line, due to accumulation of scales on the costal area. The first sub-marginal cell is longer and narrower than the second posterior, and both are very short; the supernumerary transverse is connected with the middle transverse and forms a very obtuse angle; the posterior transverse is much nearer the base of the wing than the middle transverse. The scales are of typical *Culex* form. The halteres are yellowish-brown.

Legs unbanded; coxae yellow; the femora fawn, those of the third

pair are much lighter; the tibiae and tarsi are brownish-fawn. The legs are entirely covered with scales and hairs. The claws of the three pairs of feet are of equal size, and each has a tooth; their formula is 1-1. 1-1. 1-1.

The abdomen is brown dorsally, with a narrow apical band on each segment; on the ventral surface we find just the reverse, there being a narrow brown apical band to the segments. Laterally are found little spots of white scales; at the posterior border of each segment, especially on the venter and sides, are found long hairs.

Length (including proboscis).—7.5 mm.

Habitat.—Three ♀'s taken in the village of Counani, Guiana, by Dr. Mathis, in the month of January.

CULEX NIGRIPALPUS. Theobald.

(Mono. Culicid. II., p. 322, 1901.)

Dr. Low has given me the following note on this species, which he originally sent me: "This was bred from larvae taken out of a pool near the cemetery in St. Lucia, the same pool that I got the larvae of the *Uranotaenia Lowii* from. In addition to those there were many *Anopheles* larvae present. The small pond presented no peculiar features; it was thickly covered at parts with aquatic vegetation, and I made use of it as a sure find for *Anopheles* larvae, when I required them for experimental purposes. I am not sure, but I think I got the same mosquito in St. Vincent. If so, it was bred again from larvae taken out of a pool behind the town."

Additional locality.—Barbados, one ♂ bred from larvae taken at Chancery Lane Swamp (Dr. Low).

CULEX SALISBURIENSIS. Theobald.

(Mono. Culicid. II., p. 112, 1901.)

Additional locality.—Pretoria (Dr. Theiler), ♂ and ♀.

Notes.—The thorax in the ♀ sent by Dr. Theiler is to some extent ornamented with golden and brown scales. The characteristic abdominal ornamentation, the short thick palpi and the curious disposition of the cross-veins are shown in the Figs. 204 and 205 of the second volume of this Monograph.

Time of capture.—February.

♂. Palpi brown, with scarcely any trace of pale banding, the antepenultimate joint swollen apically, also the base of the

penultimate, hairs deep brown; antennae banded with deep brown and grey, plume-hairs brown; thorax as in the ♀; abdomen with narrow apical white bands; legs deep brown, unbanded; fore and mid unguis black, unequal, both uniserrated.

Length.—3·5 mm.

CULEX OCELLATUS. n. sp.

(Plate XI.)

Head dark brown to black, with grey scales, white at the sides and around the eyes. Thorax brown, with two dark eye-like spots at the roots of the wings. Abdomen deep brown, not banded or spotted. Legs deep brown, pale basally and ventrally, unbanded, with a metallic ochraceous tinge. Proboscis, palpi and antennae brown. Wings with typical brown *Culex* scales.

♀. Head black, with scanty narrow-curved grey scales in the middle, white flat ones at the sides, and white curved scales

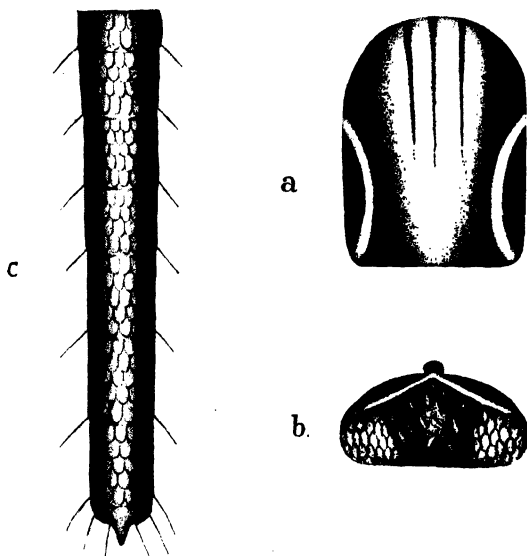


Fig. 116.

Culex ocellatus, n. sp.

a, thoracic; b, cephalic, and c, abdominal ornamentation.

forming a border to the eyes. Antennae brown, basal joint testaceous; proboscis thick, brown; palpi brown, densely scaled. Thorax brown—deep brown in some lights, pale in others—

showing three more or less distinct median dark parallel lines and a dark eye-like patch on each side over the base of the wings with a line of slightly paler scales surrounding their inner edge, covered with very small narrow hair-like curved brown scales; scutellum paler brown, with a median dark crescentic patch and dark laterally, median lobe with six bristles, in two groups slightly separated; metanotum deeper brown than the scutellum; pleurae pallid.

Abdomen deep brown to almost black, with violet reflections; last segment smaller than the rest, apex acuminate, apparently no posterior border-bristles, but lateral ones, and some on the last segment; venter pallid.

Legs deep brown, unbanded; the coxae and venter of femora ochraceous, and, to some extent, the venter of the tibiae; unguis small, equal and simple.

Wings small, densely brown scaled, and with very pronounced veins, the median vein scales large in proportion to the size of the wing, the lateral long and thin; fork-cells short, the first sub-marginal longer, but no narrower than the second posterior, its base slightly nearer the base of the wing than that of the second posterior, its stem half the length of the cell; stem of the second posterior more than two-thirds the length of the cell; posterior cross-vein rather more than twice its own length distant from the mid cross-vein; costal border with dense spine-like scales; fringe brown, dense and long. Halteres with pale brown stem and fuscous knob.



Fig. 117.

Wing of *Culex ocellatus*. ♀. n. sp.

Length.—2 to 3 mm.

Habitat.—Sao Paulo, Brazil (Dr. Lutz).

Observations.—Described from a single ♀, practically perfect. It is one of the smallest *Culex* I have seen, and has particularly dense scaled wings. The thoracic ornamentation can only be seen in certain lights, when it is very prominent, in other lights the thorax looks almost unadorned.

Regarding this species, which was pointed out as new by Dr. Lutz, and the name suggested by him, he writes as follows:—

“I send you a new *Culex* from bromelias which I propose to call *ocellatus*. It has a black spot at the root of the wing, another on the metanotum and a black line on the side; characters resembling *Uranotaenia Lowii* and *Culex pleuroscriptus*. For the

rest, it seems a close relative of *C. imitator*, being also very greenish in general colour. The proboscis is rather long and downwardly directed, as in *Uranotaenia*."

The greenish colour does not appear in the dead specimen sent.

A fresh ♂ and ♀ were received later somewhat larger in size (4 mm.).

CULEX SCHOLASTICUS. Theobald.

(Mono. Culicid. II., p. 120, 1901.)

Additional localities.—Trinidad (C. H. Hewlett); British Guiana (Dr. Low); Calliagua, St. Vincent, two ♂'s from crab-holes with *Deinocerites* (Dr. Low).

Notes.—The British Guiana specimens have the posterior cross-vein nearer the mid than the West-Indian, and the lateral spots more of a yellow tint than creamy white, as seen in the West Indian specimens.

CULEX PIPIENS. Linnaeus.

(Mono. Culicid. II., p. 132, 1901.)

Additional localities.—Madeira (Funchal, 1,800 feet, and Quinta Val); Teneriffe (La Laguna and Santa Cruz de Santiago), April and March; Algeria (Dr. Billet).

CULEX FLAVIPES. Macquart.

(Mono. Culicid. II., p. 149, 1901.)

Additional localities.—Trinidad (C. H. Hewlett); Georgetown, British Guiana (Dr. Low).

Notes.—Variation of the stem of the first fork-cell is very marked in the Trinidad specimens; one ♀ has the stem half the length of the cell; others only one-third of the length. Another colour variation is seen in one ♀, which has two pale scaled round spots on the mesonotum and some pale scales on its anterior margin. This probably forms a distinct variety—*var. biocellatus*.

The Trinidad specimens have also a very variable stem to the first fork-cell, some one-third, others one-fourth the length of the cell.

CULEX FATIGANS. Wiedemann.

Culex anxifer. Coquerel (Bigot).

Auss. Zweiflüg. Ins., p. 10, 1828, Wiedemann; Mono. Culicid. II., p. 151, 1901, Theobald; Soc. Ent. de France, 1858, Annales (*anxifer*.)

Additional localities and dates of capture.—British Guiana (Dr. Low), July; Ceylon, at Kurmregalla, Badulla, Balangoda, Keleni Valley (Green), in January, March and November; Mozufferpur, Major Green; Sidney and Brisbane, N.S.W. (Froggatt), April and December; Mombasa (J. C. Johnson), August; Antigua (Forrest), June and July; Mauritius (Daruty and d'Emmerez); Straits Settlements, the Dindings, Perak (Dr. Wright); Trinidad, Chagnanas and Cunupia (Dr. Lasalle); St. Kitts, Dominica, Barbados, Carriacou, Grenada (Dr. Low); Victoria, Seychelles (R. Denman); Sambalpur (Murphy); Etawah, N.W.P. (Major Scotland); Shaohyling, China (Cornford).

Notes and observations.—Dr. B. G. Corney, writing from Fiji, describes this species as the "nocturnal mosquito taken in dwelling-houses on a small hill about sixty feet above surrounding plain, under cultivation with sugar-cane, for 1,500 acres, well-drained, a river flowing through—locality Navna."

The Mombasa specimens sent by Dr. Johnson were taken in native huts. They present minor differences to the type, the first sub-marginal cell being rather long, the abdominal banding mostly crescentic, but in one specimen triangular. The specimens sent from Mauritius under the name *C. anxifer*, Bigot, are apparently large, dark *fatigans* only. This name must, I think, sink as a synonym.

Dr. Low sent the following notes on this cosmopolitan insect:—

"Breeding grounds.—A typical domestic mosquito. I have never seen it breeding except in the artificial collections about houses, e.g., water barrels, wells, tubs, tanks, privies, fountains, cisterns and such similar sites. Commonly found in the same water as *Stegomyia fasciata*. I remember a barrel of water in St. Lucia where I used to obtain my larvae for experimental purposes was simply teeming with both sorts. Kept together

in captivity, they seem to agree perfectly, and do not molest each other.

“The imago.—It is nocturnal in its habits and does not feed by day. Once wishing to have a man with *Filaria demarquaii* embryos in his blood bitten during the day, I made the cage perfectly dark with a black cloth, but even then they would not

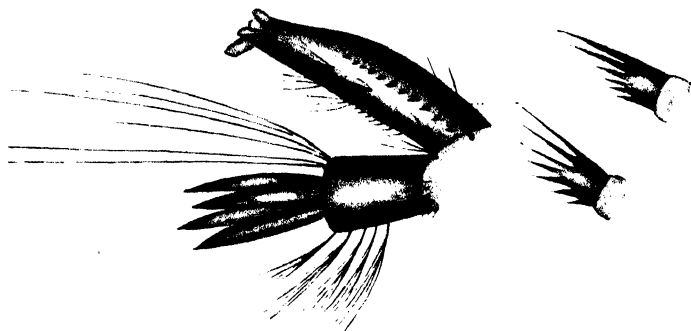


Fig. 118.

Caudal end of larva of *Culex fatigans*, sub. sp. *Skusei*, Giles.

bite. On the introduction of the hand of a patient into the house at night they bit freely. They frequent cupboards, presses, and other dark situations during the day and prefer dark clothes like the *Stegomyia*.

“It is the chief spreader of filarial disease in the West Indies, acting as the intermediate host for *F. nocturna*.* I agree with you that Dr. Manson’s original work in China was probably done on this species, and also Bancroft’s later work in Australia. It is inefficient for *F. demarquaii*.”

Regarding this species, Dr. Bancroft writes as follows:—

“House mosquito of Australia (which Skuse described but did not name).—Lately I have found that this mosquito is the Australian intermediary host for *Filaria immitis*.” Grassi has spoken of this mosquito thus: ‘*C. ciliaris* of Australia, which is synonymous with *C. pipiens*, etc.’ Now I should like to say to you this, the House Mosquito of Australia is not a native mosquito, but was introduced. It is strictly nocturnal in habit;

* Brit. Med. Jour., 1.6.01, p. 1336.

will not breed away from houses, not a hundred yards even, never in ponds or large water courses, but always in tanks, water troughs, ashpit-closets, etc. It never goes wild and never flies about in the day-time." Of course, as pointed out in Vol. II., p. 164, this refers to *C. fatigans*, Wiedemann.

This species is a regular pest in St. Michaels, Azores, and in Madeira, and is very troublesome at night. Local medical men informed Dr. Grabham that they often meet with cases of *elephantiasis*.

The Larva (figs. 118 and 119) of the sub-species *Skusii* (Giles) has not a very long siphon when adult, but has when young; the sides of it have eleven spiny processes, with six or seven rays. These seem the most characteristic feature in the larva. The antennae terminate in six bristly hairs, and have a dense long lateral tuft. The clypeus is rather spiny, and there are two frontal bristles. The larva figured here came from Queensland per Dr. Bancroft.



Fig. 119.
Antenna of larva of
C. fatigans, sub. sp. *Skusii*.

CULEX TIGRIPES. Grandpré (1900).

Culex maculicrura. Theobald (1901).*

(Mono. Culicid. I., p. 34, 1901.)

This is the most interesting species in the collections sent by Dr. Bancroft from Australia. It was described as *C. maculicrura* in the "Monograph of Culicidae," † but whilst in the press Grandpré and Charmoy described it as *C. tigripes*. This very marked mosquito has a peculiar distribution. Specimens have been received from Natal, British Central Africa, Mashonaland, Bonny, and Mombasa, as well as Australia. Grandpré described it from Mauritius. The series from Queensland consists of five ♀'s and seven ♂'s. I can detect no difference in them from those taken in Africa. It is called by Dr. Bancroft the "long-lived

* I have not had time to make a fresh examination of this species, but I feel sure it must be removed from *Culex*. The larvae present marked peculiarities not seen in *Culex*, and also the two following species, *concolor* and *Halifaxii*.

† Vol. II., pp. 34-37.

mosquito." They were all taken in February. Dr. Bancroft writes regarding this species as follows :—

"Although to be found all the year round, but always very scarce, will not bite. It is possibly out of its proper latitude. It breeds in fresh-water butts about houses and in fresh water."

Specimens have been kept alive for as long as five months.

Specimens from Uganda have the abdomens very plain, there being apical yellow spots and traces of apical banding to the apical segments only. Dr. Low took them in a house.

Additional localities.—Pretoria (Dr. Theiler); Lagos (Dr. Strachan), one ♂ in December; Zomba (Dr. Gray), in January; Nigeria (Dr. Hanley), in August; Dindings, Straits Settlements, in December; Uganda (Dr. Low).

The larva and pupa of C. tigripes.

The larva is quite different to others of *Culex* type. It is 10 mm. long and greyish-brown in colour; the head has large

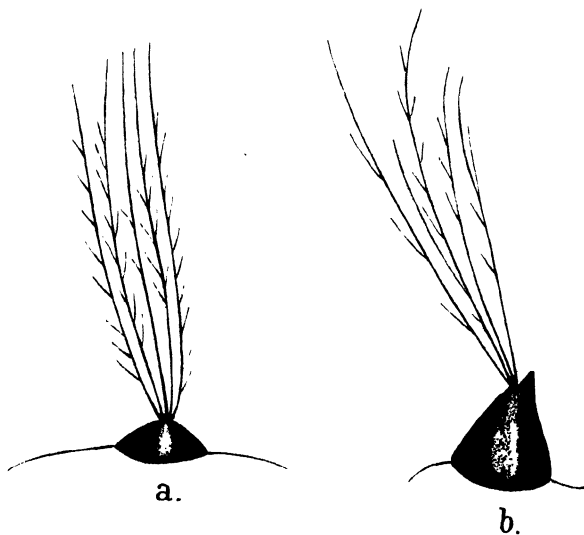


Fig. 120.

Culex tigripes, Grandpré.

a, Abdominal hairs of larva; b, of thorax.

fan organs like a *Megarhinus*, a truncated clypeus and simple antennae ending in two spine-like bodies, one broader than the

other, and two terminal bristles and two lateral ones near the apex ; the head is much smaller than the thorax and provided with simple hairs only ; the eyes prominent. Thorax large, with lateral branched hairs (fig. 120, b) arising from the side of brown conical papillae. Abdomen composed of nine segments, the first

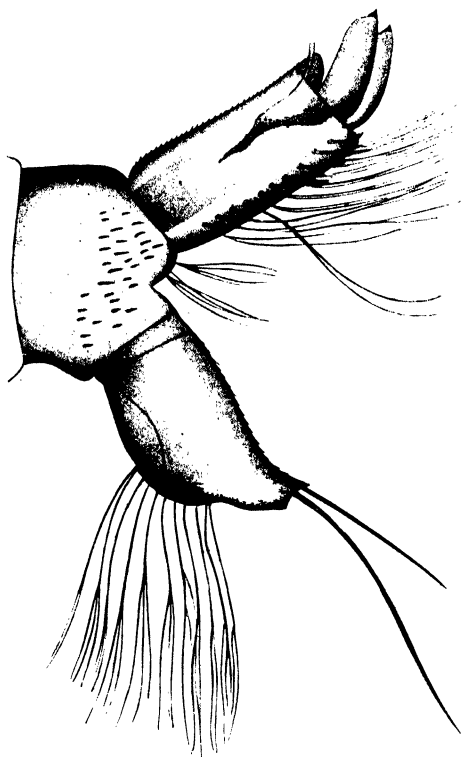


Fig. 121

Culex tigripes, Grandpré.
Posterior extremity of larva.

six with lateral plumose hairs (fig. 120, a) arising from brown prominent papillae, flatter than those of the thorax ; seventh segment devoid of the papillae ; the siphon (fig. 121) very short, arising from the eighth segment, serrated on its upper edge with long hairs and two rows of short spines on the lower, one row mixed up with the fan of hairs ; ninth segment terminates in

two long bristles and has about eleven long branched hairs forming the ventral fan ; the upper border is serrated.

The pupa (fig. 122) is about 9 mm. long, with siphons much as in *Culex*, but the opening is larger and more lateral (*vide*

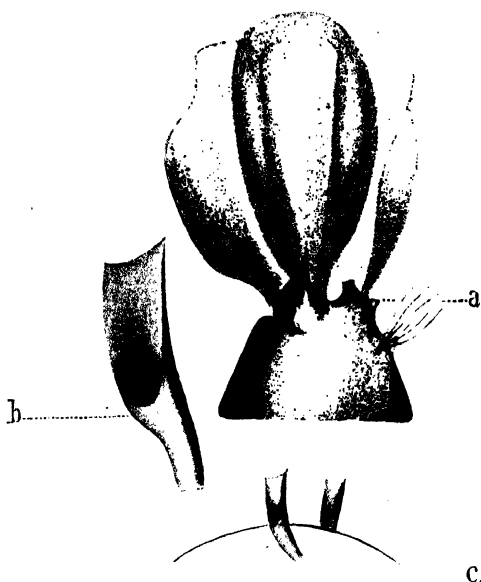


Fig. 122.

Pupal structures in *Culex tigripes*.

a, anal flaps ; b, enlarged siphons ; c, siphons in situ.

Fig. 122, b). The anal fan is peculiar (*vide* figure). On the posterior borders of the segments are some branched hairs.

CULEX CONCOLOR. Robineau-Desvoidy.

(Mono. Culicid. II., p. 107, 1901.)

Additional localities.—Fresh specimens from Perak (Dr. Wright); and from Kuala Lumpor (Dr. Durham); Canara District, Goa Frontier (E. H. Aitken).

Further Note on the Larva.

Mr. Aitken sends a note on the larva of this species which contains some additional characters to those given me by Captain James (Vol. II., p. 110).

"The head is brown, but the body is usually of a transparent white colour, except the posterior half of the thorax, the third, sixth and last segments of the abdomen and a central line, which are of a rich brown hue. It floats horizontally, but of course not at the surface, the breathing tube being moderately long. This creature feeds, as far as I have seen, exclusively on other larvae, catching them by any part and chewing them up, undisturbed by their wriggings. I fed mine on *Culex* and *Anopheles*, but they devoured each other also till there were only two monsters of equal size left, which produced fine ♀ mosquitoes.

"I found this species with other larvae in grassy pools, and once in a very deep well. I have also taken them from a well in Bombay. As might be inferred from its habits, this larva differs in many points from that of a typical *Culex*. The most obvious difference, and one that can be seen with the naked eye, is in the antennae. Those of *C. fatigans* are long and tufted at the ends, and, standing out like the jaws of a stag-beetle, give the insect a horrific aspect. In the larva of *concolor* they are short as in *Anopheles*. The jaws are formidable, and the brushes, which are large and consist of very stout bristles combed at the inner edge, do not overhang the mouth, but extend laterally."

Dr. Durham found the larvae in buffalo-wallows.

This species must also be removed from *Culex*.

CULEX HALIFAXII. n. sp.

Thorax brown, with slightly darker linear ornamentation when denuded, covered with brown scales with paler ornamentation and a dark curved line at the sides of the posterior half of the mesonotum. Abdomen dark brown, unbanded; venter with broad basal creamy white bands and patches. Legs brown, with an ochraceous tinge, unbanded; femora with a few scattered pale scales, long and moderately thick. Posterior cross-vein in a line with the mid.

♀. Head brown, with narrow-curved creamy grey scales

in the middle and creamy grey upright fork scales, which become deep brown at the sides; palpi rather long, thick, densely-scaled with deep brown scales and with black bristles; proboscis deep brown, almost black at the tip; clypeus deep brown; antennae brown.

Thorax deep brown, with two broad paler grey median parallel lines and a lateral curved one on each side showing on the denuded surface; covered with narrow-curved rich brown scales and ornamented with rather creamy ones (too denuded to make out the ornamentation), there are two pale spots on the middle of the mesonotum, paler scales at the sides and some in front; traces of a narrow dark curved lateral line may be seen with the lens in some lights along the basal half of the mesonotum; scutellum brown, with narrow-curved scales; metanotum bright brown, with a median dark line; pleurae pale brown and ashy-grey, with two or more patches of white scales.

Abdomen covered with dusky blackish-brown scales, unbanded above, but with small basal lateral white spots, most prominent on the apical segments; border-bristles dull brown; first segment mostly covered with dusky brown scales; venter with very broad creamy white basal bands, in some segments taking up more than five-sixths of the segment.

Legs brown, unbanded, with a distinct ochraceous tinge showing through the scales, which are mostly brown; the femora have pale yellowish scales scattered on the ventral surface, and there are also a few ochraceous scales in somewhat spotted arrangement, knee spot and apex of tibiae yellowish, femora and tibiae bristly; unguis equal and simple.

Wings with typical brown *Culex* scales; first sub-marginal cell about the same width, but a little longer than the second posterior cell, its base nearer the apex of the wing than that of the latter, stem rather more than half the length of the cell, about the same length as that of the second posterior cell; posterior cross-vein in a line with the mid cross-vein; halteres with a pallid stem and fuscous knob.

Length.—7 mm.

Time of capture.—December.

Habitat.—Dindings, Straits Settlements.

Observations.—Described from a single ♀ in which the thorax is unfortunately partly denuded, so that the scale ornamentation cannot be made out. This large gnat is a very

marked species, yet there is no particularly striking character that one can place on paper, except the marked disposition of the cross-veins. There is a general dull metallic ochraceous hue over the greater part of the insect in some lights owing to the ground colour showing through the scaly armour.

GENUS 21. **GILESIA.** nov. gen.

(Plate XII.)

Head covered with rather broad flat spindle-shaped scales; mesothorax with scattered flat spindle-shaped scales and narrow curved ones; *scutellum with small flat scales* and some spindle-shaped ones. Palpi four-jointed in the ♀, rather long, about one-fourth the length of the thick proboscis, apical joint long, penultimate joint swollen, globose, the two basal joints small. Basal joint of the antennae with numerous hair-like bristles and a few small flat scales. Ungues very thick, rather short and all with a thick blunt tooth. Wing venation much as in *Culex*; fork-cells short and the veins clothed with rather broad elongated scales like *Taeniorhynchus*.

Male unknown.

This genus is related to *Culex* on the one hand and *Stegomyia* on the other, whilst the wings give it a *Taeniorhynchus*-like appearance. The important characters are the scale ornamentation of the head and scutellum and the hairy and scaly basal antennal joint and the curious claws and palpi. A single species only is known from Queensland.

GILESIA ACULEATA. n. sp.

Thorax dark brown, with scattered, flat, spindle-shaped, creamy scales, narrower in the middle than at the sides; pleurae brown, with numerous scattered pale scales. Abdomen deep brown, with irregular basal creamy bands, which expand into large lateral patches, apical segments with scattered pale scales, thickest on their apical borders. Legs brown, with scattered creamy scales, metatarsi and tarsi, except the last, with basal pale creamy bands.

♀. Head brown, covered with flat spindle-shaped pale

creamy scales, except round the eyes, where the scales are smaller and bright golden, there are also numerous narrow black upright forked scales; clypeus shiny black; palpi bright yellowish testaceous, with rather scanty flat black scales and a few black bristles, longish, about one-fourth the length of the black proboscis, which is rather thick; antennae brown, the basal joint and the three following joints bright ochraceous, basal joint with numerous black hairs and a few small flat black scales, second joint with a few small black scales also.

Thorax dark brown, scantily covered with rather large flat creamy spindle-shaped scales at the sides of the mesothorax and behind, with narrow-curved creamy yellow scales in the middle; a few rather short black bristles over the roots of the wings; scutellum dark brown, testaceous at the base, irregularly covered with small flat and small spindle-shaped creamy scales, with apparently a double row of brown bristles to the border of the median lobe; metanotum brown and deep testaceous, shiny; pleurae dark rich brown, with numerous scattered pale flat scales.

Abdomen greyish brown at the base, steely black at the apex (when denuded), covered with deep brown scales with dull violet reflections, traces of irregular creamy white to almost yellow basal banding on the basal segments, on the last three apical segments the pale scales spread out over the whole of the segments, giving them a mottled appearance, and especially forming more or less distinct ochraceous yellow apical bands, the scales on the apical segment being particularly bright; the basal pale-scaled bands spread out laterally to form distinct large lateral creamy white spots; venter with scattered white scales.

Legs brown, mottled on the femora, tibiae, and metatarsi with yellow scales; tarsi and metatarsi with basal creamy white bands, except the last tarsal joint; apex of femora, tibiae, and other joints dark scaled; the pale scales form more or less of a ring before the black apex of the femora; tibiae very bristly, and to some extent the femora; the whole of the last tarsal joint on all the legs black; unguis large and thick, all uniserrated.

Wings large, slightly clouded; the veins covered with brown *Taeniorhynchus*-like scales (Plate XII.), wings longer than the abdomen; fork-cells short; first sub-marginal cell slightly narrower

and scarcely longer than the second posterior cell, its stem more than half the length of the cell, its base a little nearer the apex of the wing than that of the second posterior; stem of



Fig. 123.

Wing of *Gilesia aculeata*. ♀. n. sp.

the latter more than two-thirds the length of the cell; posterior cross-vein rather close to the mid cross-vein; halteres with pale stem and brown knob.

Length.—6 mm.

Time of capture.—May.

Habitat.—South Queensland (Dr. Bancroft).

Observations.—Described from two ♀'s sent by Dr. Bancroft to the British Museum. It is a very marked species, easily told by the scale ornamentation, which clearly places it in a distinct genus. The palpi are also very marked. To some extent it resembles *Culex cantans*, Meigen, but the claws are much stouter and the scale ornamentation differs. Dr. Bancroft sends the following note on this species: "I found them on two occasions in a particular spot in a jungle near here (Bupengary); they flew down from the trees to bite me."

GENUS 22. LASIOCONOPS. nov. gen.

Head clothed with similar scales to *Culex*; antennae with the basal joint with a few scales; palpi short in the ♀. Thorax clothed with narrow-curved scales. Abdomen clothed with flat scales and with large *projecting flat lateral scales, with deeply dentate apices*, in more or less dense tufts. Wings with typical *Culex* scales and venation.

This genus is separated from *Culex* on account of the peculiar and characteristic lateral scales on the abdomen, which give the insect a ragged appearance.

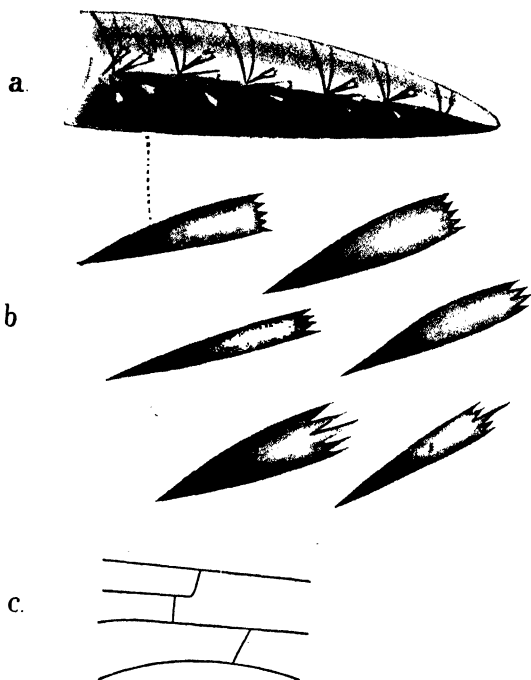


Fig. 124.

Lasioconops poicilipes. n. sp. (♀.)

a, Side view of abdomen ; b, lateral abdominal scales ; c, cross-veins.

A single species only at present occurs, *L. poicilipes*, from West Africa. The ♂ is unknown.

LASIOCONOPS POICILIPES. n. sp.

Anterior half of thorax with ashy-grey and chestnut-brown scales, the former towards the edge of the pale area, posterior part of the thorax dark brown, with brown scales. Abdomen black, with basal white bands ; proboscis brown, with a pale median band. Legs deep brown, the femora mottled with creamy scales, the tibiae with a row of pale spots, metatarsi and tarsi

with narrow basal pale bands, which to some extent involve the apices of the preceding segments.

♀. Head dark brown, with narrow-curved, pale grey scales, brown and ochraceous forked scales, and small, flat, grey ones at the sides; antennae brown, basal joint black on the inside, with small white scales, and with a grey sheen on the outside, second joint bright testaceous; palpi with black scales, and apical grey ones; proboscis black scaled, with a pale median band; clypeus deep brown, with frosty sheen.

Thorax black, the anterior two-thirds clothed with narrow-curved, grey scales, palest at the posterior edge of this pale scaled area, where they form a wavy line; posterior portion of the mesonotum with narrow-curved, black and brown scales and numerous black bristles; scutellum brown, with narrow-curved, dull creamy scales, and with eight black border-bristles to the mid lobe; pleurae black, with patches of white scales and pale creamy hairs.

Abdomen black, with narrow basal bands of white scales and very large and peculiar white and ochraceous lateral projecting scales; posterior border-bristles golden, short; venter black, with white scales.

Legs dark brown, the femora spotted and mottled with pale scales, the tibiae with small creamy spots; metatarsi and tarsi dark brown, with narrow, pale, ochraceous bands involving both sides of the joints.

Wings with typical brown *Culex* scales; surface of the wing with minute bristles; first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the latter, its stem about one-fourth the length of the cell; stem of the second posterior not quite one-third the length of the cell; supernumerary cross-vein not level with the mid cross-vein, a little nearer to the base of the wing; posterior cross-vein about two and a half times its own length from the mid cross-vein; sixth vein rather densely scaled. Halteres dusky ochraceous.

Length.—6 mm.

Habitat.—Bonny, West Africa (Annett); and Gambia (Dutton).

Time of capture.—July (Annett); December (Dutton).

Observations.—Described from a single ♀, somewhat denuded, but easily told from all other *Culicidae* by the curious abdominal lateral scales, which are certainly of generic importance. The

spotted legs give it some resemblance to *Culex tigripes*, but the banded tarsi and proboscis and general ornamentation will at once separate it.

GENUS 23. **MELANOCONION.** nov. gen.

(Plate XII.)

Palpi short in the female and long in the male. Head clothed with narrow-curved scales and upright forked ones, the latter predominating; proboscis expanded apically.

Thorax covered with narrow-curved scales, also the scutellum. Legs unbanded; unguis of the ♀ very small, equal and simple; in the ♂, those of the fore and mid unequal, uniserrated, of the hind equal and simple. Femora swollen at the base, also at the apex, and also the apices of the tibiae swollen.

Wings with the veins covered with dense broad scales on the apex of the wings and along the costal border (Plate XII.), upper border with black spine-like scales.

This genus is separated from *Culex* on account of the squamose character of the wings, which are very characteristic. They are all small black gnats, which bite viciously and which occur in swamps and woods.

Six species are known, namely *atratus*, Theobald, *rima*, Theobald, *humilis*, Theobald, and the three new ones described here. The three first I placed provisionally in the genus *Culex*.

They tabulate as follows:—

1. Thorax unadorned.

A. Abdomen ornamented.

Abdomen with basal white spots, pleurae

blackish *atratus*. Theobald.

Abdomen with basal white spots, pleurae

yellow *luteopleurus*. n. sp.

Abdomen with basal white bands *humilis*. Theobald.

Abdomen with four white apical spots

in ♀; unadorned in ♂ *rimus*. Theobald.

B. Abdomen unadorned *indecorabilis*. n. sp.

2. Thorax adorned *spissipes*. n. sp.

Note on the larvae and pupae of Melanoconion atratus.

Dr. Grabham writes as follows:—

“I have collected the larvae in the permanent ponds in the Ferry Swamp, where they are present in great numbers; neither the minnows nor dragon-fly larvae appear to destroy them. They

are easily recognised from the larvae of other local culices by their delicate transparent outline, small size, and relatively great length and fineness of the respiratory siphon. They feed on algae; both larvae and pupae are often bright green in colour. The upper two-thirds of the respiratory siphons of the pupa is black or very dark grey in colour, in striking contrast to the rest of the body of the pupa, which is very transparent, especially just after metamorphosis, only the eye-spots and siphons being pigmented; the dark portion of the siphon has a paler grey band about the centre. *Culex atratus* is a troublesome pest in swamps. I have not met with it often in Kingston. The females only attack at all times of the day and night, and ordinary mosquito netting is no protection against it."

Dr. Low noticed the difference in these larvae from those of *Culex*, such as *C. fatigans*, having a much longer respiratory siphon. They live in ponds with vegetation and outside collections of water. The adults bite readily, causing severe irritation.

Plate XVI. shows the larva and pupa.

MELANOCONION ATRATUS. Theobald.

Culex atratus. Theobald.

(Mono. Culicid. II., p. 55, 1901.)

Additional localities.—British Guiana, taken in the bush and at Georgetown hospital, and also bred from larvae at Georgetown in July, October, and also taken in November (Dr. Low); New Amsterdam, taken in dwelling-houses (S. D. Rowland); Para, Brazil (Dr. Durham); Barbados, two ♀'s, one taken in swamp, the other in the town in June (Dr. Low); St. Lucia, bred from larvae, in November (Dr. St. George Gray).

MELANOCONION LUTEOPLEURUS. n. sp.

Thorax deep brown, with brown narrow-curved scales; pleurae bright yellowish; scutellum ochraceous, with three black patches of scales; metanotum dark brown, surrounded by pale ochraceous. Abdomen black, with basal lateral small pale spots and pale testaceous basal segment. Legs black, unbanded. Wings with rather dense brown scales on the apical portions.

♀. Head brown, with a few narrow-curved dull grey scales, densely clothed with rich, deep yellow, upright forked scales and

with a few flat creamy-white lateral ones ; a few large black bristles projecting forwards and inwards ; antennae and palpi brown ; proboscis much swollen apically, jet black.

Thorax with the mesonotum black, with elongated, narrow curved black scales and black bristles ; prothoracic lobes ochraceous, nude, with a few bristles ; pleurae and the lower part of the sides of the mesothorax bright yellowish, with a few black scales ; scutellum ochraceous, with three patches of black narrow curved scales, showing as three dark spots, median lobe with six black bristles ; metanotum black.

Abdomen black, covered with black scales, with small basal lateral white spots ; first segment pale ochraceous, with two median patches of black scales and long golden hairs. Legs black, coxae and venter of femora pale ochraceous ; femora swollen ; apices of the tibiae also swollen ; unguis small, equal, and simple.

Wings with brown scales except the costa and first long vein, which are black scaled ; fork-cells rather short, the first submarginal longer and narrower than the second posterior-cell, its base nearer the base of the wing, its stem about one-third the length of the cell ; stem of the second posterior nearly as long as the cell ; posterior cross-vein a little more than its own length distant from the mid cross-vein ; bases of the wings bright testaceous. Halteres with bright ochraceous stem and fuscous scaled knob.

Length.—5 mm.

Habitat.—Para (Dr. Durham).

Observations.—Described from a single ♀. A very marked black and yellow to ochraceous species, the black and yellow parts of the thorax being very strongly defined. The curious swollen appearance of the apices of the femora and tibiae is also very noticeable.

MELANOCONION RIMUS. Theobald.

Culex rima. Theobald.

(Mono. Culicid. II., p. 327, 1901.)

♂. Palpi entirely black ; apical joint with black hairs ; antennae with blackish plume-hairs. Thorax ornamented as in female, pleurae very pale grey ; abdomen narrow, entirely black, unbanded and unspotted.

Legs brown, coxae grey ; fore and mid unguis unequal, uniserrated, the fore rather straight ; hind equal and simple.

Length.—2·8 mm.

Habitat.—Lagos (Dr. Strachan).

Time of capture.—December.

Observations.—Described from a ♂ taken by Dr. Strachan. The ♀ only has been previously described.

MELANOCONION INDECORABILIS. n. sp.

Head blackish-brown, with a narrow pale-scaled border round the eyes; proboscis black, unbanded. Thorax dull dusky-brown; abdomen dusky-black, unbanded and unspotted, venter with a dull ochraceous tinge. Legs deep blackish-brown, unbanded. Wings with brown scales, fork-cells moderately long, apices of veins densely scaled.

♀. Head black, with dusky-brown narrow-curved scales and brown upright forked scales, a border of white narrow-curved scales around the eyes; antennae and palpi deep brown; proboscis blackish-brown, swollen at the apex.

Thorax deep blackish-brown, covered with long narrow-curved bronzy-brown scales and some black bristles; scutellum paler brown, with thin narrow-curved black scales and six brown border-bristles to the mid lobe; metanotum black; pleurae paler brown.

Abdomen black, unbanded and unspotted; posterior border-bristles small and dull; venter dull, with an ochraceous hue. Legs brownish-black to almost black, unbanded; coxae and bases and venter of the femora rather paler; femora slightly swollen; ungues small, equal and simple.

Wings with brown scales (Plate XII.), those on the apex of the wing dense and broad; first sub-marginal cell longer and narrower than the second posterior cell, its base considerably nearer the



Fig. 125.

Melanoconion indecorabilis. ♀. n. sp.

Two wings to show variation in stems of fork-cells.

base of the wing, its stem about one-third of the length of the cell, stem of the latter equal to nearly two-thirds the length of the cell or rather more; posterior cross-vein longer than the

mid-cross vein, twice its own length distant from it. Halteres with ochraceous stem and fuscous knob.

Length.—3·5 to 4 mm.

♂. Palpi black, unbanded, longer than the proboscis by nearly the whole of the last two joints. Abdomen with traces of basal white bands. Fore and mid unguis unequal and uniserrated, hind equal and simple; apices of the fore and mid tibiae expanded (?).

Length.—3·5 mm.

Habitat.—Para, Brazil (Dr. Durham).

Observations.—Described from three females and a single male. I am not sure if this is the male of this species, but they occurred in the same box; I cannot, however, separate it satisfactorily from the male of *M. humilis*. The females can at once be told from the other species of this genus by the unbanded and unspotted abdomen.

MELANOCONION SPISSIPES. n. sp.

Head black; thorax with the anterior half golden, the posterior half black; pleurae brown. Abdomen black, unbanded, with small lateral basal white spots and pallid venter. Legs black, unbanded, the middle pair very thick and rather flattened.

♀. Head black, with narrow-curved dusky scales, black and deep brown upright forked scales, and flat black lateral ones;

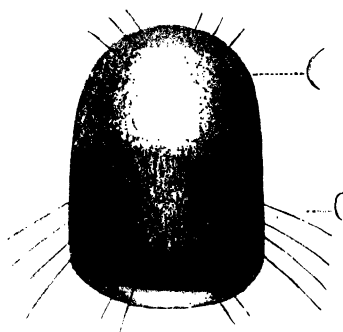


Fig. 126.

Thorax of *Melanoconion spissipes*. n. sp.

antennae deep brown, one side of the basal joint and the base of the second joint testaceous; palpi and proboscis black; the frons slightly projects as a knob; clypeus black; eyes silvery. Thorax black, the front half covered with narrow-curved bright golden scales, the posterior half with small curved black and bronzy scales and with numerous long black bristles; there are also black bristles projecting from the

front of the thorax; scutellum black, with narrow-curved dull golden scales and eight black bristles to the median lobe; metanotum deep black; pleurae brown, with some grey scales.

Abdomen entirely black above, with moderately long dull golden border-bristles, laterally at the base of the segments are small white patches of scales; venter pallid, with an ochraceous tinge on the apical portion, grey at the base; the base of the segments palest.

Legs black; coxae brown; venter of femora, especially of the hind pair, pale; the fore femora are swollen and the mid pair of legs prominently swollen, having a somewhat flattened appearance; hind legs long; unguis equal and simple.

Wings with typical brown *Melanoconion* scales; first submarginal cell longer and narrower than the second posterior cell, its base a little the nearer the base of the wing, its stem rather less than half the length of the cell; stem of the second posterior rather more than half the length of the cell; posterior cross-vein nearly twice its own length distant from the mid; halteres with pale stem and black knob.

Length.—4·5 mm.

Habitat.—Trinidad (C. W. Hewlett).

Observations.—Described from a single ♀. It cannot be mistaken for any other member of the genus on account of the thoracic ornamentation and the curious thick flattened mid legs. The black velvety ground colour and the golden thorax and pale venter form a strong contrast.

GENUS 24. **GRABHAMIA**. nov. gen.

(Plate XI.)

Allied to *Culex* and *Taeniorhynchus*. Palpi of ♀ 4-jointed, with the apical joint minute, penultimate joint long and thick, two basal joints moderate sized. Palpi of ♂ long; the last two joints may be slightly swollen and have distinct hair-tufts. Head with narrow-curved scales, upright forked ones, and flat lateral ones. Thorax with narrow-curved scales. Legs mostly mottled and spotted. Wings with rather thick median scales and often short broadish lateral ones on some of the veins, neither so long nor dense as in *Taeniorhynchus*. Wings short and stumpy. Fork-cell short. Scales mottled.

Ten species previously included in *Culex* come in this genus:—*dorsalis*, Meigen; *sollicitans*, Walker; *Jamaicensis*, Theobald; *Durbanensis*, n. sp.; *pygmaeus*, n. sp.; *ambiguus*, n. sp.;

pulcritarsis and *pulcripalpis*, Rondani ; and *Spencerii*, Theobald ; and *Curriei*, Coquillett.

The eggs are laid singly, not in rafts. The larvae have comparatively short thick siphons (*vide* fig. 131).

GRABHAMIA JAMAICENSIS. Theobald.

Culex Jamaicensis. Theobald.

(Mono. Culicid. I., p. 345, 1901.)

The ♂ has not been described :—

♂. Palpi longer than the proboscis by nearly the whole of the last two joints, brown, with narrow pale basal bands to the

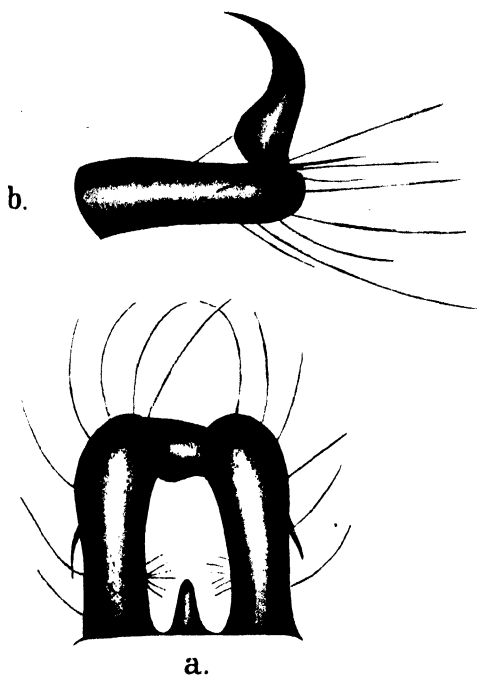


Fig. 127.

Grabhamia Jamaicensis. Theobald.

a, ♂ genitalia ; b, one clasper.

last two joints, the apical joint slightly shorter than the penultimate, both with sparse black hairs, and also the apex of the

antepenultimate; proboscis deep brown, with a narrow pale band on the apical half; antennae brown, with narrow grey bands and flaxen brown plumes.

Thorax deep brown, with scattered golden narrow-curved scales; pleurae brown, with white scales; metanotum chestnut-brown.

Abdomen deep brown, with apical triangular bands of creamy-grey scales, broken in the middle; the base of the segments show two bare patches, which appear pale, owing to the shiny surface of the integument catching the light.

Legs with the metatarsi and tarsi with narrow white basal bands, except the last two joints of the fore and mid legs; femora with a white ring near the apex; tibiae spotted; fore unguis unequal, the larger biserrated, the smaller uniserrated; mid also unequal, the larger with a small tooth, smaller simple; hind claws equal.

Wings with the first sub-marginal cell smaller than the second posterior cell, both short; posterior cross-vein longer than the mid, and nearly twice its own length distant.

The genitalia are well defined, the claspers (fig. 127) being short and sickle-shaped.

Length.—5·5 mm.

Notes.—Eggs laid singly, not in rafts (Grabham). This species I originally described as a *Culex*, but it must be removed to



Fig. 128.

Wing of *Grabhamia jamaicensis*. ♀. Theobald.

a new genus. The scales on the wings differ from typical *Taeniorhynchus* in the region of the second posterior cell and its stem and elsewhere, and so cannot be included in that genus.

GRABHAMIA PYGMAEA. n. sp.

(Plate XI.)

Differs from the former in the following characters: Thorax mottled with dark brown, bright brown, and creamy scales, the dark brown forming more or less distinct spots and a median

line in front ; the metatarsi show no traces of median banding ; there is no trace of the small black spot at the base of the third long vein, and the wing scales are shorter and rather broader, and the specimens are about half the size of *Jamaicensis*. The apical bands on the abdomen are as in the former species, but are much whiter.

The wing is as follows : Fork-cells short, the first sub-marginal a little longer and narrower than the second posterior ; base of the first sub-marginal cell about level with the base of the second posterior cell ; stem of the first sub-marginal cell a little more than half the length of the cell ; stem of the second posterior nearly two-thirds the length of the cell : posterior cross-vein about its own length behind the mid cross-vein ; elongate lateral scales on the apex of the first, the third, fourth, and fifth veins ; broad ones elsewhere (Plate XI.).

Habitat.—Antigua (Forrest) ; and Jamaica (Grabham).

Time of capture.—August (Forrest) ; March (Grabham).

Observations.—Described from a series sent by Mr. Forrest. The rather short and broad wing scales on the branches of the second fork-cell and its stem are shown in Plate XI.

GRABHAMIA DURBANENSIS. n. sp.

(Plate XIV.)

Thorax ornamented with silvery-grey and reddish-brown scales, the latter mostly in the middle of the mesonotum. Head with silvery-grey narrow-curved scales, with a smaller lateral black spot ; proboscis ochraceous, with a black apex and base. Abdomen black, with basal white bands. Legs dark brown, mottled with pale scales ; metatarsi and tarsi with basal pale bands. Wings mottled with dark and pale scales.

♀. Head deep brown, with narrow-curved grey scales in the middle, flat black and white ones at the sides, the former forming a lateral spot, numerous thin black upright forked scales ; clypeus black, with a tubercle on each side near the base ; palpi rather long, densely scaled with brown scales at the base and white at the apex ; antennae brown, three basal joints testaceous, the basal one with pale scales, the next two with dark scales ; proboscis deep ochraceous, the apex black, and also the base.

Thorax black, ornamented with rich brown and pale grey narrow-curved scales, the former mostly in the middle of the mesonotum, and to some extent forming irregular ornamenta-

tion at the sides; pale grey scales in front of the scutellum; scutellum with pale narrow-curved scales; metanotum chestnut-brown; pleurae brown, with grey scales.

Abdomen dark brown, with basal white bands and yellow apical lateral spots, last segment unbanded; venter deep brown, with scattered grey scales.

Legs brown; femora and tibiae mottled with creamy scales; coxae deep brown; knee spot pale; metatarsi and tarsi with narrow pale basal bands, except the last fore and mid tarsi; ungues of the fore and mid legs thick, uniserrated, and equal, of the hind equal and simple.

Wings mottled, with pale and dark scales; first sub-marginal cell considerably longer than the second posterior cell, its stem a little less than half the length of the cell, its base not quite level with that of the second posterior cell; stem of the second



Fig. 129.

Wing of *Grabhamia Durbanensis*. ♀. n. sp.

posterior cell two-thirds the length of the cell; posterior cross-vein rather more than its own length distant from the mid cross-vein. Surface of the wing covered with very short curved bristles. Halteres with pale ochraceous stem and fuscous knob.

Length.—5 mm.

Habitat.—Durban (S. R. Christophers).

Time of capture.—January.

Observations.—Described from a single ♀. It can be at once told by the thoracic ornamentation, peculiar mottled wings, and basal abdominal banding, and apical yellow lateral spots.

GRABHAMIA SOLLICITANS. Walker.

Culex sollicitans. Walker.

(Mono. Culicid. I., p. 368, 1901.)

Note.—This species breeds in brackish water, preferring the brackish swamps which are overflowed at very high tides. It is the most common mosquito on the Atlantic seaboard. "It occurs," says Professor Howard, "along the New Jersey coast, the Long Island coast, along Staten Island, at Virginia summer resorts at

Tybee Island, Georgia and St. Augustine and Charlotte Harbor, Florida. It also occurs inland, especially throughout New Jersey.

The relative lengths of the fork-cells are somewhat variable.

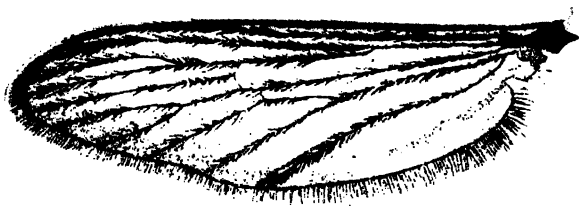


Fig. 130.

Wing of *Grabhamia sollicitans*, Walker. ♀.

A figure of the wing is given above.

Additional locality.—Jamaica (Dr. Grabhami).

GRABHAMIA AMBIGUUS. n. sp.

Proboscis banded. Thorax with the anterior two-thirds with pale golden scales, with two dark spots, the anterior third with black scales. Abdomen with apical and basal pale banding, and with apical ochraceous spots. Legs apically and basally banded. Wings with mottled scales.

♂. Palpi deep brown, with five pale ochraceous bands, the apical half of the apical joint pale and ending in one large dark spine, the next two bands involving both sides of the joints, narrow, the following broad, about the middle of the antepenultimate joint; the basal one small, involving both sides of the joint; the two apical joints and apex of the antepenultimate with long hairs, black except at the yellow bands. Proboscis with a pale band on the base of the apical half, and with numerous rather long hairs below it; there are also white scales on the basal half of the proboscis. Antennae banded grey and brown, with dark brown plume-hairs. Head brown, with pale narrow-curved scales, ochraceous upright forked ones in front, black ones behind, flat creamy white ones at the sides.

Thorax deep brown, the anterior two-thirds with narrow curved pale golden scales, with two eye-like spots of brown scales, the posterior third with narrow-curved black scales; scutellum paler brown, with narrow-curved pale scales; metanotum chestnut-brown.

Abdomen black, with basal and apical ochraceous bands and

apical ochraceous spots ; venter ochraceous, with two black spots to some of the segments near their apical borders.

Legs brown, with apical and basal ochraceous bands to the joints, except the last two of the fore and the last of the hind and the mid ; the femora speckled with pale scales dorsally and pale ventrally ; ungues of the fore and mid legs unequal, unserrated, of the hind equal and simple.

Wings with dense, rather large mottled scales, brown and ochraceous ; first sub-marginal cell longer and narrower than the second posterior cell, their bases nearly level ; stem of the former more than half the length of the cell ; stem of the latter fully two-thirds the length of the cell ; posterior cross-vein more than twice its own length from the mid cross-vein.

Length.—5·5 mm.

Habitat.—Quilon (James).

Time of capture.—July.

Observations.—Described from a single ♂ in perfect condition taken by Captain James. The abdominal ornamentation is very marked, and the thorax is also characteristic.

GRABHAMIA CURRIEI. Coquillett.

Culex Curriei. Coquillett.

(Canadian Entomologist, p. 259, 1902.)

The following is Mr. Coquillett's description of this species :—

“ ♀ . Head black, scales on lower parts of occiput white, on the upper part light yellow, usually a patch of golden-brown ones between, a few erect black scales and bristles on the sides, antennae and mouth parts dark brown, base of the former yellow ; body black, scales of mesonotum light yellow, a median and usually a lateral vitta of golden-brown ones, those of the pleura white, of the abdomen yellowish white, a pair of black-scaled spots on segments 2 to 5 ; femora and tibiae yellow, brownish at the apices, covered with mixed yellowish-white and brown scales, tarsi brown, the front ones having the base and apex of the first two joints and base of the third, the middle with the base and apex of the first three joints and base of the fourth, the hind ones with both ends of the first four joints and the whole of the last one whitish, all the claws one-toothed ; wings hyaline, scales of the veins mixed yellowish-white and brown, petiole of first sub-marginal cell about three-fourths as long as the cell ; halteres yellow.

“ *Length*.—4 to 5 mm.

“ Five ♀ specimens, type No. 5798, U. S. National Museum.

“ *Habitat*.—University, N. Dakota, June, 1896, Mr. R. P. Currie (after whom the species is named) ; Colorado ; Boire, Idaho (Mr. C. B. Sampson) ; Palo Alto, California (November 8, 1900 ; Professor V. L. Kellogg). ”

Note.—This species is closely related to *dorsalis*, *pulcripalpis* and *pulcritarsis*; but it is certainly distinct from *dorsalis*, for I have never seen that species with white hind tarsus; this occurs in *pulcripalpis*, but that species has simple hind ungues.

I have not seen the species, but I feel sure it is distinct (F. V. T.).

GRABHAMIA SPENCERII. Theobald.

Culex Spencerii. Theobald.

(Mono. Culicid. II., p. 99, 1901.)

Additional locality.—Idaho, Market Lake (Prof. Aldrich).

Notes and observations.—Professor Aldrich sent me some specimens of this mosquito under the name *Culex Curriei*, Coquillett. They cannot be that species, as they have unbanded legs. On the other hand, they resemble structurally my *Spencerii*, described from Canada, but differ from it in abdominal ornamentation. As the Canadian specimens, all from the same locality, showed marked abdominal variation, I propose to place the Idaho specimens as a distinct variety only, the differences from the type being defined below:—

Variety *Idahoensis*. n. v.

Abdominal basal bands almost white, broad apical bands yellowish-white to white, very narrow, almost obliterated on some segments; the abdomen not pale at the sides, so that only broad basal and narrow apical pale areas are shown, the two apical segments are mostly pale scaled, and there are scattered pale scales on the others. The pale thoracic scales are also of a more frosty hue than in the type.

Professor Aldrich sends the following note regarding this species: "It is so small that it readily crawls through ordinary mosquito screen. At the hotel in Market Lake it was found necessary to apply a thick coat of paint to the screens after they were in place; this reduced the size of the holes enough so that no further trouble was experienced in their coming through. It is a very annoying species, and seems to breed altogether in an arm of the Snake River which lies beside the little town, and which has no current except during the period of high water in the spring. Two miles from the town, where the only breeding-place is the seepage from irrigating ditches, there is a different species of mosquito."

An error occurs in my description of this species (Vol. II., p. 100): the third vein is dark scaled, as shown in the figure—not the second, as stated in the text.

GRABHAMIA DORSALIS. Meigen.

Culex dorsalis. Meigen.

(Mono. Culicid. II., p. 16, 1901.)

Additional localities.—The banks of the Thames on the Essex side.

Notes.—In Vol. II., p. 18, delete in line 18 "in the simple unguis." The hind unguis are uniserrated.

The *larva* has a short blunt siphon with a ventral row of

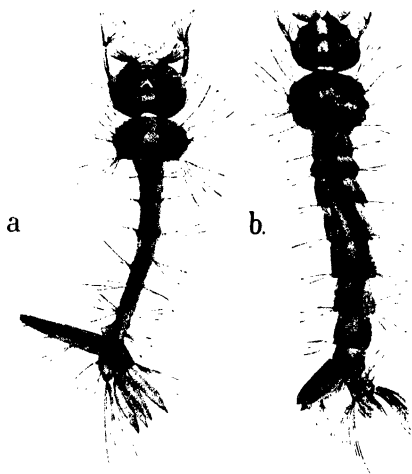


Fig. 131.

a, Larva of *Culex pipiens*; b, Larva of *Grabhamia dorsalis*.

black curved spines, and a tuft of seven plumose bristles arising from one stem towards its tip in a line with the spines. The anal flaps are small; two much smaller than the others.

GENUS 25. **ACARTOMYIA.** nov. gen.

(Plate XIII.)

Allied to *Culex* and *Grabhamia*, but differing in cephalic ornamentation from *Grabhamia* and in the male palpi from *Culex*.

Head clothed with flat *irregularly-disposed* scales all over, with patches of narrow-curved and numerous upright forked scales, giving the head a ragged appearance; antennae scaly at the base, the joints in the male short and thick; the second joint in the ♀ rather swollen. Palpi of the ♀ four-jointed,

the apical joint minute, rounded, the penultimate joint large, truncated apically; in the ♂ the two apical joints and the apex of the antepenultimate swollen, the apical one large and clavate, hair-tufts small. Thorax with narrow-curved scales, and also the scutellum. Wings with the fork-cell rather small, with mottled scales on the veins, the scales on the major portions of the veins rather broad and with crenulated edges. Larvae with short thick siphons.

This genus differs from *Culex* and *Grabhamia* in having flat scales over the head—not regular and closely applied to the head as in *Stegomyia*, from which it also differs in having clavate ♂ antennae and no flat scales on the scutellum. The ragged appearance of the head is very marked, otherwise it comes very near *Grabhamia*.

ACARTOMYIA ZAMMITIL. n. sp.

Head ochraceous yellow at the sides, white in the middle; proboscis ochraceous black at the base and apex. Thorax brown, ornamented with bright yellowish brown and pale creamy curved scales, ornamentation much as in *G. dorsalis*; metanotum pale brown, with a dark centre. Abdomen deep blackish-brown, with basal white bands, which in the fifth and sixth segments spread out laterally; a few median pale scales on the last two segments, venter all creamy. Legs with apical and basal pale bands and with the last hind tarsal white. Wings with mottled brown and grey scales. Female unguis 1—1. 1—1. 1—1.; in the ♂ 2—1. 1—1. 1—1.

♀. Head (fig. 132, a) deep brown, with loose flat white scales in the middle, a few narrow-curved ones in front, and some irregular ones behind, on each side of the median pale scales are irregular loose flat ochraceous yellow scales and a few narrow-curved ones around the eyes, forked scales white, yellowish and black at the sides; clypeus deep brown; proboscis deep ochraceous, black scaled at the base and on the apex; palpi deep brown, with white scaled apex, and a white band lower down; antennae brown, basal joint deep brown, with small white flat scales, the next few joints pale, the second one swollen, and with a few small flat white scales.

Thorax deep brown, ornamented with narrow-curved golden-brown and narrow-curved pale creamy scales, the latter in front and forming two lines on the dorsum, somewhat expanded about the middle of the mesonotum, pale scales are also present before

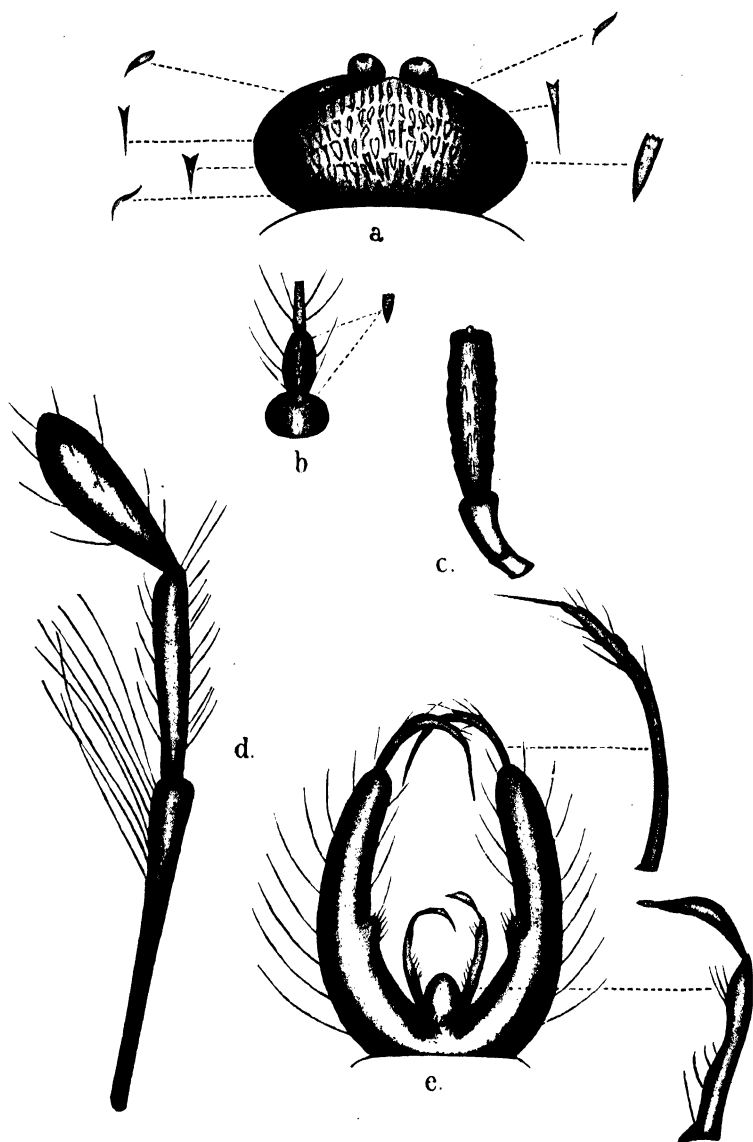


Fig. 132.

Acartomyia Zammitii. n. sp.

a, Head of ♀; b, base of antenna; c, ♀ palp; d, ♂ palp; e, ♂ genitalia.

the scutellum ; the pale scales are rather broader than the golden-brown ones ; scutellum deep brown, with irregularly disposed creamy white narrow-curved scales ; pleurae brown, with flat white scales ; metanotum pale brown, with a median deep brown line.

Abdomen deep brown, with almost black scales, each segment with a basal white band, those on the fifth and sixth spreading out laterally and contracted in the middle, apex of the sixth with a median creamy scaled patch, the seventh with many pale scales ; basal segment pale brown at the sides, with a dark median patch and white median scales ; venter entirely covered with creamy scales

Legs with the coxae ochraceous, with grey scales ; femora ochraceous, mottled with black scales, pale beneath ; tibiae the same, only with more dark scales towards the apex, extreme apex with a pale band ; metatarsi and tarsi with prominent pale basal and apical bands, the last joint of the hind legs dull white ; ungues all equal and uniserrated.

Wings with the veins with brown and grey scales, giving a mottled appearance ; scales both broad, with the free edge crenulate and narrow and straight, the latter as lateral ones on the apical portions of the veins ; first sub-marginal cell longer and narrower than the second posterior cell, its base very slightly nearer the apex of the wing than the base of the second posterior



Fig. 133.

Wing of *Acartomyia Zammittii*. n. sp. (♀).

cell, its stem rather more than half the length of the cell ; stem of the second posterior cell about two-thirds the length of the cell ; posterior cross-vein slightly more than its own length distant from the mid, the mid slightly longer than the supernumerary. Halteres with ochraceous stem, and slightly fuscous knob covered with grey scales.

Length.— 4 mm.

♂. Palpi straw-coloured, the last two joints swollen and brown scaled, the apical one clavate, the two apical segments have basal white bands, the penultimate joint with many white

scales spreading from the base upwards; there are three more or less distinct dark scaled rings on the long straw-coloured joint; the last two joints and apex of the antepenultimate with yellowish-brown hairs; antennae straw-coloured, with rather thick, stumpy joints and flaxen plume-hairs, apical joints darker. Thorax as in ♀.

Abdomen with the fifth, sixth, and seventh segments with the white basal band projecting in the middle as well as laterally; densely covered with long pale flaxen pubescence.

Legs much as in the ♀; fore unguis unequal, the larger biserrated, the smaller uniserrated; mid unguis unequal, both uniserrated; hind equal and uniserrated.

Wings with the fork-cells very short, the first sub-marginal about half the width of the second posterior, but slightly longer, its base a little nearer the base of the wing, its stem about two-thirds the length of the cell; stem of the second posterior nearly as long as the cell; posterior cross-vein about its own length distant from the mid cross-vein. Genitalia shown at Fig. 132, e.

Length.—4·5 mm.

Habitat.—Malta (Dr. Zammit).

Time of capture.—July, August and September.

Observations.—Described from a series sent by Dr. Zammit. It comes very near Rondani's *C. penicillaris* as re-described by Ficalbi. I cannot detect, however, the basal tooth in the mid larger unguis of the male, and the genitalia, although very similar, presents certain differences to those shown in Ficalbi's figure. The abdominal adornment also differs, especially in the absence of the median black line on the venter, and the simple basal white bands on the dorsum.

From *pulcripalpis* (Rondani) it differs in having distinctly clavate ♂ palpi and the ♂ unguis of the fore legs have two teeth to the larger one, not one as in *pulcripalpis*; from *pulcitaris* by the same character of the larger fore unguis, having two teeth, not one tooth, and in having an ornamented, not unadorned thorax.

From *dorsalis* and *Spencerii* by having the last hind tarsal white. This species occurs breeding in numbers in salt pans along the shore line, and is found in July, August and September.

The larvae (fig. 134), which live in salt pans along the shore, have long, single-jointed, cylindrical antennae, with short stiff spines, and terminate in one long and several short spines, on the

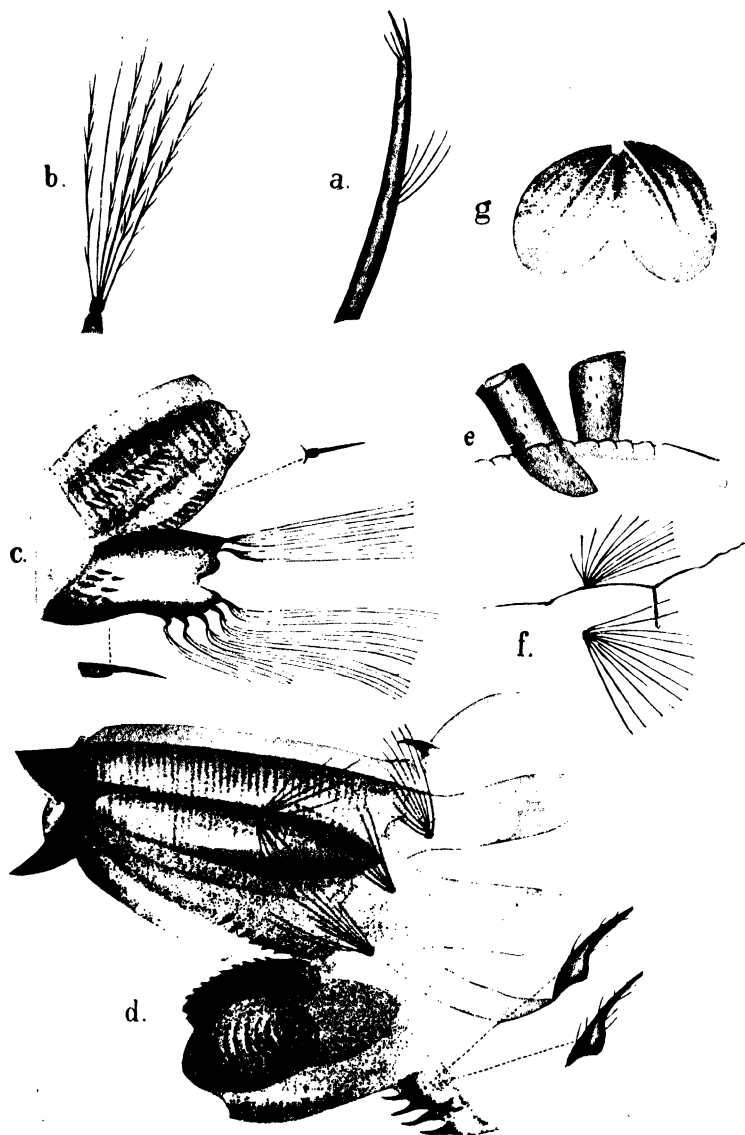


Fig. 134.

Larva and pupa of *Acartomyia Zammitii*. n. sp.

a, Antenna of larva; b, thoracic side hairs of larva; c, caudal end of immature larva; d, caudal end of mature larva; e, siphons of pupa; f, first abdominal segment of pupa; g, anal fins of pupa.

outer side on the basal half a tuft of a few fine hairs; thorax broader than the head, with lateral tufts of plumose bristles arising from brown tubercles; respiratory siphon very short and thick, with a row of short thick pointed spines on each side, about fifteen in number, and two ventral rows of ten near the base of the siphon, numerous short spines at the base of the last segment, the apical segment with dorsal and ventral hair tufts; in the adult larva there are also stiff spines at the base of the siphon on the segment, two prominent tufts of hairs on each side at its base, and a small one on the side about the middle of the siphon.

Length.—8 mm.

The *pupa* with rather short siphons, with truncated openings; the segments much constricted, the posterior borders with a few short stiff spines, also lateral tufts; anal processes large and expanded, almost round; brown.

Length.—6 to 6.5 mm.

GENUS 26. **TAENIORHYNCHUS.** Arribalzaga.

(Mono. Culicid. II., p. 190, 1901.)

Several new species are added to this genus. There is some variation in the structure of the palpi.

Professor Goeldi has observed the eggs of *T. fasciolatus*. They are laid in curved rows close together, and are shaped like champagne bottles, and have the air chambers spread over their whole surface. The larvae have very long antennae. Full notes on these will be published by Professor Goeldi.

TAENIORHYNCHUS FULVUS. Wiedemann.

Culex fulvus. Wiedemann.

Culex flavicosta. Walker.

(Mono. Culicid. II., p. 208, 1901.)

(Plate XII.)

A fresh series of this species has been received from Professor Goeldi, of Para; from these some additional notes are appended, as I have been able to dissect some of the specimens.

♀. Legs with apical dark bands to the joints, not basal, as described in Vol. II., p. 208; the legs are dark in some specimens when denuded; the fore and mid unguis are not simple, but unserrated and of moderate size.



Fig. 135.
Taeniorhynchus
fulvus, Wiedemann.
♀ palp.

The wing when flattened out is as follows: Costal and first long vein yellow-scaled, except at the apex; sub-costal yellow, and also part of the third and fourth veins; apices of the costal and first long vein, the branches of the fork-cells, most of the third, dark-scaled; remainder of the veins with scanty brown scales; bases of the fork-cells nearly level; the supernumerary and mid cross-veins join, but at an open angle, not in a straight line. The palpi (Fig. 135) are four-jointed, the penultimate joint being very long, the apical one minute.

Additional localities.—Para, Brazil (Goeldi and Durham); British Guiana (Low).

Time of capture.—April, in Para (Goeldi).

TAENIORHYNCHUS TENAX. Theobald.

(Mono. Culicid. II., p. 198, 1901.)

Additional localities.—Sierra Leone, Free Town (E. E. Austen), two ♀'s bred from a roadside puddle in September; Durban Bay Hotel, near the shore (Dr. S. R. Christophers), two ♀'s taken in January; Shaohyling, China (Cornford); Perak (Dr. Wright).

Notes.—The two Durban specimens I referred to in Vol. II., p. 199, as not being *Taeniorhynchi*, by more careful examination have been shown to belong to this species.

The abdomen is subject to much variation; in some there are traces of basal median pale spots, others show no such traces, but have pale scales dotted all over the abdomen. The unguis of the ♀ are all equal and simple, and the mid scutellar lobe in the four species recently examined had ten bristles. *Culex annulioris*, Theobald (Vol. I., p. 371), is very similar at first sight, and the description applies very closely to this species, but the fore unguis of the ♀ are unserrated, and the mid scutellar lobe has only eight border-bristles.

The specimen sent by Mr. Cornford from China has both apical and basal abdominal banding.

In some specimens—for instance, those from China—the anterior thoracic ornamentation is not pale golden, but distinctly ashy-grey and bright reddish-brown, and shows two bare dark eye-like spots.



Fig. 136.

Wing of *Taeniorhynchus tenax*. ♀. Theobald.

The wing scales are also mottled brown and yellow and the fork-cells are not of such unequal width as stated in Vol. II., p. 199. The description in Vol. II. was drawn up from a single ♀, in which the wings were not flat.

TAENIORHYNCHUS CONFINNIS. Arribalzaga.

(Dipt. Argent., La Plata, p. 49, 1891, Arribalzaga.)

Thorax deep rich chestnut-brown, with small golden-brown curved scales, and ornamented with pale scales in front, and a V-shaped patch on each side about the middle of the mesonotum, and pale scales in front of the scutellum. Abdomen deep brown, with silvery white apical bands. Proboscis banded. Legs deep brown, with pale speckled femora and tibiae and basal pale bands to the metatarsi and tarsi.

♀. Head brown, with narrow-curved pale golden scales and numerous long thin brown upright forked scales; antennae deep brown, with narrow clear pale bands, except the three basal joints, which are bright brown, the basal one with a few narrow-curved golden scales; proboscis usually with a broad pale band, but very variable, some having the band quite narrow; palpi testaceous brown, with broad black scales except on the apex, which is covered with very small narrow-curved golden ones. Thorax deep rich chestnut-brown to deep brown, covered with very small curved bronzy-brown scales, orna-

mented with narrow-curved pale scales in front, and a more or less roughly formed V-shaped area on each side in front of the wings, some pale scales in front of the bare space in front of the scutellum, and others running across the nude area just in front

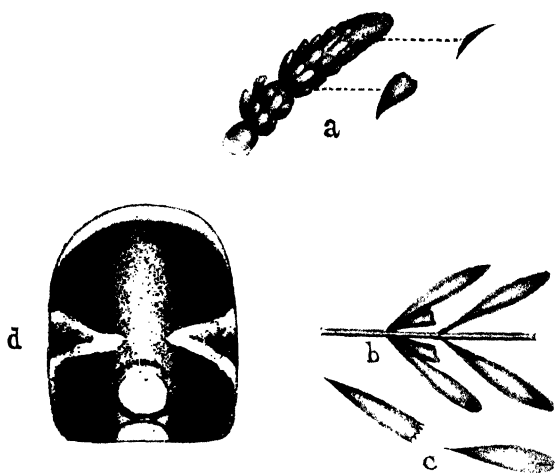


Fig. 137.

Taeniorhynchus confinnis. Arribalzaga.

a, Palp of ♀; b and c wing scales; d, thoracic ornamentation.

of the scutellum; scutellum bright testaceous brown, with narrow curved pale scales and a dense double row of long black border-bristles; metanotum deep brown; pleurae bright brown, with some patches of pale scales.

Abdomen deep brown, with violet reflections, the segments with narrow pure white apical borders, in certain lights appearing silvery; first segment pallid, with a few median dark scales; venter covered with yellowish scales.

Legs deep brown to almost black, banded and speckled with pale yellow; bases of the legs bright brown; femora and tibiae almost black, with rows of small yellow spots; apex of the tibiae pale, and also the bases of the metatarsi pale banded; the first two of the fore and mid and all the hind tarsi with rather broad basal pale bands; ungues equal and simple. Wings slightly tinged with brown; the veins clothed with small brown *Taeniorhynchus*-like scales; the first sub-marginal cell a little longer and narrower than the second posterior cell, its stem

equal to a little more than half the length of the cell, its base slightly nearer the apex of the wing; posterior cross-vein longer



Fig. 138.

Wing of *Taeniorhynchus confinnis*. ♀. Arribalzaga.

than the mid, more than twice its own length distant from the mid; halteres pale ochraceous.

Length.—5 to 6.5 mm.

Habitat.—Cara Cara Creek, Demerara River, British Guiana (Low); Trinidad (C. H. Hewlett); Argentina, Chaco, in Formosa (Arribalzaga); Para (Dr. Durham).

Observations.—Dr. Low has sent me specimens of what are undoubtedly Arribalzaga's *Taeniorhynchus confinnis*. The species has also been sent from Trinidad, the latter specimen being much darker and smaller than the British Guiana ones, and also those of Dr. Durham's from Para. This species is evidently very variable, for some in the series show the proboscis as Arribalzaga described, *i.e.*, broadly pale banded; others have the pale band quite narrow. It is a very marked species, however, with speckled legs and silvery white apical abdominal bands, such as occur in no other *Taeniorhynchus*. It is evidently a common South American species, but I have not yet seen it from Brazil.

TAENIORHYNCHUS ARRIBALZAGAE. n. sp.

Deep black and brown; proboscis with a narrow white band; thorax deep brown, apparently unadorned, covered with narrow-curved black scales; abdomen black unbanded, venter with grey basal bands; legs black, fore femora with yellow band near apex; fore and mid metatarsi and first two tarsi with basal pure white bands, all the tarsi in the hind legs with basal white bands; wings with the veins densely scaled with brown scales.

♀. Head deep brown, with narrow-curved dull brown scales and pale grey ones round the eyes in front and with numerous

black upright forked scales ; antennae deep brown, with narrow pale bands, basal joint and base of the second joint bright deep reddish-brown ; clypeus black ; proboscis covered with black scales, with a narrow median white band and a pale apex ; palpi rather long, pale brown, covered with black scales and a snow-white apex.

Thorax deep, rich brown, covered with scattered jet black narrow scales and with numerous black bristles ; scutellum brown, densely clothed with narrow-curved black scales and with rich brown border-bristles (five or six ?) to the mid lobe ; metanotum brown : pleurae pale dull brown, with a few patches of white scales.

Abdomen clear brown, covered with black scales with a violet tinge, no trace of any banding ; border-bristles small ; the scales clothing the abdomen rather large ; the lateral bristles moderately long, all very thin ; on the second to fifth segments there are rather long basal grey lateral spots, which become apical on the apical segments ; venter with greyish-white basal bands.

Legs black ; coxae brown ; fore femora with a yellow band near the apex, which is absent in the hind and mid legs ; but in the two latter a white spot occurs in the position of the band ; knee spot white, also the apex of the tibiae in the fore legs, fore and mid metatarsi with a basal white spot (not a band), hind metatarsi with a pure white band ; first two tarsi in the fore legs with a basal white spot almost forming a band ; traces of the same, but not so distinct, in the mid legs ; all the tarsi in the hind legs with broad basal white bands, save the last, which is all white ; ungues equal and simple.

Wings with the veins densely clothed with broad, typical brown *Taeniorhynchus* scales ; with oblique apices, surface of wings with curved bristles ; first sub-marginal cell longer and slightly narrower than the second posterior cell, its base very little nearer the base of the wing, its stem short, less than one-fourth the length of the cell ; stem of the second posterior not quite half the length of the cell ; posterior cross-vein not quite twice its own length distant from the mid cross-vein. Halteres black, with snowy-white scaled knob.

Length.—5 to 6 mm.

Habitat.—Para, Brazil (Dr. Durham).

Observations.—Described from specimens taken by Dr. Durham at Para. It is a very distinct *Taeniorhynchus* with

unbanded abdomen, of a general black appearance, with snow white ornamentation. The abdominal scales are somewhat

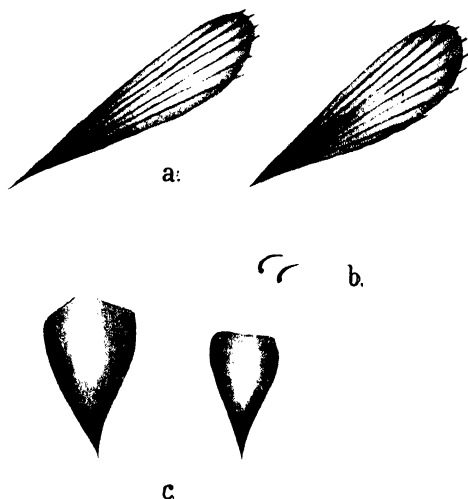


Fig. 139.

Taeniorhynchus Arribalzagae. n. sp.

, Wing scales ; b, wing hairs ; c, body scales.

peculiar, as also is the markedly ribbed appearance of the vein scales and densely bristly wing surface.

TAENIORHYNCHUS OCHRACEUS. n. sp.

Thorax ochraceous brown, with golden scales, unadorned. Abdomen completely clothed with ochraceous yellow scales, unbanded. Legs bright ochraceous yellow, with dark scales scattered over them, apex of the hind femora and tibiae dark, metatarsi and tarsi all dark brown. Wings with yellow scaled veins. Fork-cells rather short.

♀. Head ochraceous brown, with narrow-curved golden-yellow scales and black upright forked scales ; clypeus pale brown ; antennae brown, with bright ochraceous basal segment with a few hairs and a few black scales on the second segment ; palpi ochraceous at the base, deep brown scaled apically, a line of brown scales runs down to the base ; proboscis mottled with ochraceous and brown scales, the apex deep brown.

Thorax ochraceous brown, covered with narrow-curved golden scales and with long brown bristles, golden at their base, over the roots of the wings, and forming two parallel lines, one on each side of the bare space in front of the scutellum;

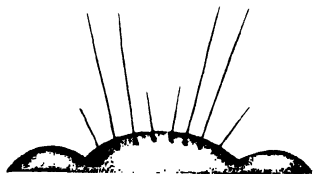


Fig. 140.

Scutellum of *Taeniorhynchus ochraceus*,
n. sp.

scutellum pale brown, with narrow-curved golden scales, four long golden brown border-bristles, and two small golden median ones and an outer small one on each side; metanotum ochraceous brown; pleurae pale ochraceous brown.

Abdomen ochraceous brown to deep brown, clothed with ochraceous yellow scales, the second to the fifth segments with traces of median purple scales; venter ochraceous yellow; border-bristles and lateral bristles golden yellow.

Legs ochraceous yellow and brown, mottled with brown scales; apex of the femora black; base and apex of the hind tibiae with black bands, fore and mid metatarsi and tarsi brown, with an ochraceous tinge; hind metatarsi ochraceous, with broad black apex, hind tarsi deep brown; fore, mid and hind ungues equal and simple, rather straight.

Wings with yellow scaled veins and dusky fringe; border-scales yellow; first sub-marginal cell longer and slightly narrower than the second posterior cell, its base slightly nearer the apex of the wing, its stem equal to about half the length of the cell; stem of the second posterior equal to about two-thirds the length of the cell; posterior cross-vein about one and a half times its own length from the mid cross-vein.

Halteres pale ochraceous.

Length.—4.8 to 5 mm.

Habitat.—Kuala Lumpur (Dr. Durham).

Observations.—Described from two perfect ♀'s. The species differs from the other Malay species in having yellow scaled, not brown scaled, veins, and also in having no thoracic ornamentation and the more ochraceous abdomen. It comes also near *T. aurites* from Africa, but differs in having black upright forked scales on the head and in the whole of the antennae being brown, whereas in *aurites* the basal segments are yellow. The scutellar bristles also differ (*vide* fig. 253, Vol. II). There are also traces of violet scales not seen in *aurites*, and the whole of

the first hind tarsal segment in this species is brown, the apex only in *aurites*, and sometimes the base of the second is pale, but always brown in this Malay form.

I think it is certainly distinct, but very closely related.

TAENIORHYNCHUS FUSCOPENNATUS. n. sp.

(Plates XIII. and XIV.)

Closely allied to *T. Annettii*, but has the yellow wing-veins with dusky scales. Thorax yellowish in the middle, darker at the sides, with yellow narrow-curved scales; abdomen variable, mostly dark basally, sometimes all dark scaled, at others with yellow scales, especially apically; proboscis yellow, with black apex; legs yellow, the femora with many dusky scales, especially in the mid pair, apex of tibiae, metatarsi and first two tarsi black, last two all black in both fore and mid legs, in the hind legs the black banding is more distinct and the tibiae have a median black ring. Wings with all the veins with dusky brown scales.

♀. Head deep brown in front and above, honey-yellow behind, with narrow-curved creamy scales, forming a more or less distinct line around the eyes, numerous black upright forked scales and black bristles projecting forwards; palpi densely clothed with yellow scales, a few black ones at the base and apex, and with black bristles; proboscis yellow, with a few black scales at the base and black at the apex; antennae deep brown, basal joint dark on the inside, pale outside, with black bristles projecting inwards, three succeeding basal segments deep ochraceous with traces of a few black scales.

Thorax in some specimens honey-yellow in the middle, dark at the sides, in others all dark brown, covered with narrow curved golden scales; scutellum pale ochraceous, with narrow curved pale golden scales and with six brown border-bristles; metanotum deep brown.

Abdomen ochraceous, variable, with dusky scales with long brown border-bristles or with yellow scales variously disposed, mostly on the apical segments and apices and middle of the segments. Fore femora ochraceous, with a few scattered black scales, especially towards the apex; tibiae similar, with black apex, also the metatarsi and first two tarsals, the apical bands pronounced, last two tarsi dark, ungues equal and simple; femora of the mid legs mostly dark scaled, also the tibiae,

metatarsi and tarsi as in the fore legs; hind legs with a broad median band as well as the apical one on the tibiae, first tarsal broadly banded black at the apex (apical joints missing in all specimens).

Wings with the veins yellow, scales nearly all dusky brown to deep brown, fringe dark brown; border-scales yellow.

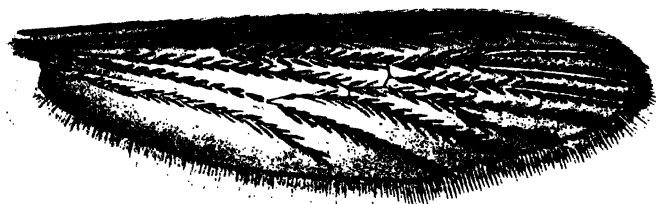


Fig. 141.

Wing of *Taeniorhynchus fuscopennatus*. ♀. n. sp.

Fork-cells long, the first sub-marginal considerably longer and a little narrower than the second posterior cell, its stem a little more than one-third of its length, its base slightly nearer the base of the wing; stem of the second posterior about half the length of the cell; posterior cross-vein about two and a half times its own length from the mid cross-vein.

Halteres ochraceous.

Length.—5.5 mm.

♂. Palpi orange-yellow, apex black, also the apex of the two following joints, hair-tufts black and orange, basal joint orange; antennae with golden plumes, brown at their apices; proboscis orange, with black apex.

Thorax as in ♀; pleurae with patches of silvery-white scales.

Abdomen orange-yellow, with narrow apical purple bands; with dense golden-yellow hairs; genitalia (fig. 142) with the claspers with a pointed tooth.

Legs orange-yellow, apex of fore tibiae with a small black band; fore metatarsi with broad apical black band, tarsi mostly black, the base of the first dull orange; mid legs the same, but the femora and tibiae with scattered black scales; hind legs also with the femora with scattered black scales, the tibiae with a narrow black median and apical band; metatarsi with a broad black apical band, also the first tarsal, but the others bronzy-black all over; unguis of the fore legs unequal, the larger

uniserrated, the smaller simple; of the mid legs the same; of the hind equal and simple.

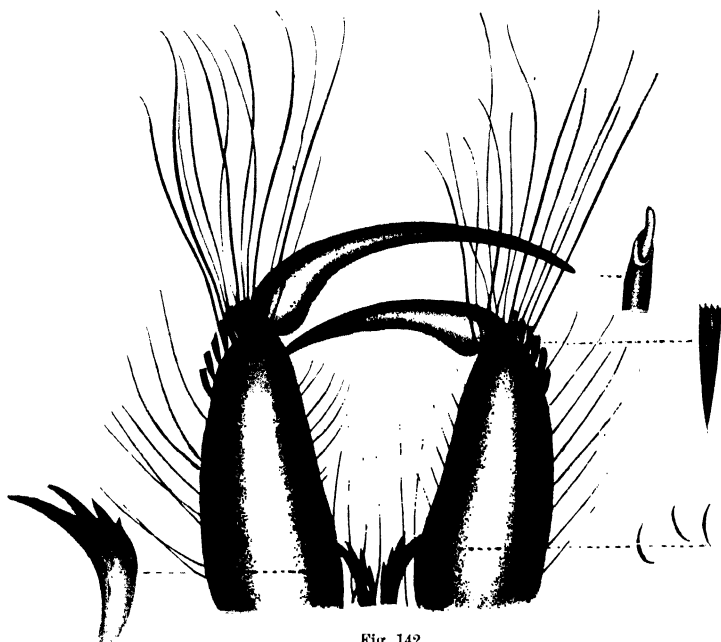


Fig. 142.

Taeniorhynchus fuscopennatus.
♂ genitalia.

Wings with the first sub-marginal cell much narrower and a little longer than the second posterior cell, its stem just

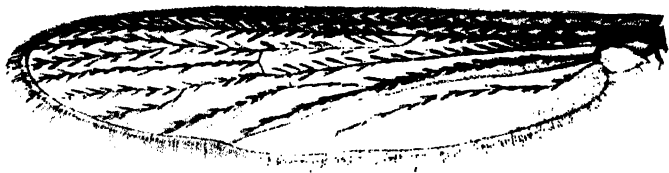


Fig. 143.

Wing of *Taeniorhynchus fuscopennatus*. ♂. n. sp.

slightly more than half the length of the cell; its base a little nearer the apex of the wing; stem of the second posterior cell

about two-thirds the length of the cell; posterior cross-vein about twice its own length from the mid cross-vein.

Length.—6 mm.

Habitat.—Entebbe, Uganda (Dr. Low).

Observations.—Described from three ♀'s and two ♂'s caught at night at Entebbe and near the Lake. It bears a very strong resemblance to *T. Annettii*, but the veins are all brown scaled, whereas in *T. Annettii* the brown scaled sixth vein is very pronounced, the most of the rest of the wing field being yellow. There is also a difference in the venation, the first sub-marginal starting nearer the apex of the wing than the second posterior and more equal in width than in this Uganda species; the mid cross-vein is also further away in *fuscopennatus*. The ♂ genitalia also differs.

The abdomen is very variable, in some all dusky, in others yellow at the apex, in others with yellow scales basally and in the middle of the segments.

Dr. Low found it abundant in woods, sitting on the under surface of green leaves. Also found indoors.

Dr. Low found two sausage-shaped filariae in the thoracic muscle of this species in Uganda.

TAENIORHYNCHUS CONOPAS. Frauenfeld.

(Mono. Culicid. II., p. 202, 1901.)

Additional localities.—Dindings, Straits Settlements, in June and December; Perak (Dr. Wright); Kuala Lumpur, Federated Malay States, not common (Dr. Durham).

TAENIORHYNCHUS BREVICELLULUS. Theobald.

(Mono. Culicid. II., p. 212, 1901.)

Additional localities.—Dindings, Straits Settlements, in June; Perak (Dr. Wright); Mukerian, Hoshiarpur (Dr. Datta); Kuala Lumpur, moderately common at night (Dr. Durham), 4.10.02.

Note.—The posterior cross-vein is about twice its own length distant from the mid, and the supernumerary and mid form an angle pointing forwards, not backwards, as in Fig. 255, Vol. II.

TAENIORHYNCHUS AURITES. Theobald.

(Mono. Culicid. II., p. 209, 1901.)

Additional localities.—Dindings, Straits Settlements, in December ; Perak (Dr. Wright).

TAENIORHYNCHUS FASCIOLATUS. Arribalzaga.

(Mono. Culicid. II., p. 192, 1901.)

Additional localities.—British Guiana, at Koriabo, Barima River, 10.8.01 (Dr. Low) ; Para (Dr. Durham) ; Trinidad, caught in a house at Cedros and common in the district (C. H. Hewlett).

Notes.—This species I now find subject to much variation in colour and size. The palpi are apparently five-jointed in the ♀. Ova and larva have been found by Professor Goeldi (*vide* p. 257).

TAENIORHYNCHUS RICHARDII. Ficalbi.

Culex Richardii. Ficalbi.

(Mono. Culicid. II., p. 194, 1901.)

Additional localities.—Norwich, England (Dr. Long) ; Wye, Kent (F. V. T.).

Note.—This species seems to be common in parts of the Norfolk Broads. It bites viciously. I found a single ♂ at Wye indoors in 1902.

GENUS 27. **MANSONIA**. Blanchard.

PANOPLITES. Theobald.

(Compt. Rend. Hebd. Soc. d. Biol., No. 37, T. liii., 1901, p. 1046
(Blanchard) ; Mono. Culicid. II., p. 173, 1901 (Theobald).)

The name I gave this very marked genus had been previously used, and it was re-named by Blanchard. Although re-named, the generic characters hold good and the habits and life-history of the genus support its marked generic distinction.

The *pupae* (Fig. 144) has been obtained by Dr. Low. It has very peculiar long curved siphons ending acuminately, and

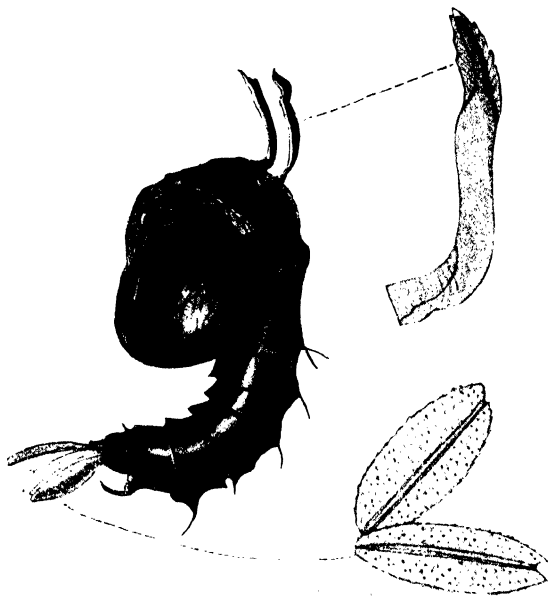


Fig. 144.
Pupa of *Mansonia uniformis*. Theobald.

characteristic anal fins. The abdominal segments are much constricted.

MANSONIA MAJOR. n. sp.

(Plate XIII.)

Proboscis broadly banded with yellow. Thorax deep brown, with two parallel pale lines and golden brown hair-like curved scales, except in front of the scutellum, where they are silvery-white. Abdomen mottled and banded with brown, ochraceous and white scales, the latter lateral. Legs deep brown, with white bands and spots, the tarsi with basal pale bands. Wings with brown and pale ochraceous scales, the former predominating.

♀. Head brown, with narrow-curved pale golden scales and black upright forked scales, which are jagged at the apex (Fig. 145), and flat white scales at the side of the head, which stand out from the surface of the head; proboscis with a broad ochraceous band in the middle, black scales at the base, and

black and ochraceous at the apex ; palpi ochraceous, with large black scales and black hairs and a few white scales mainly at the

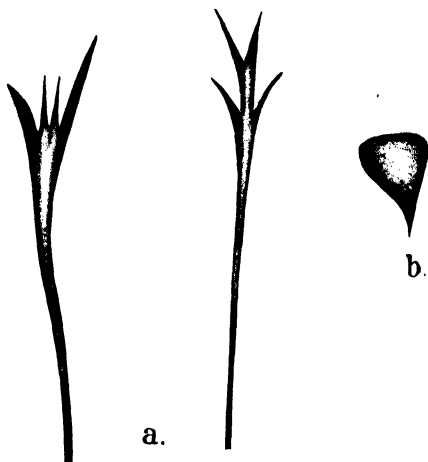


Fig. 145.

Mansonia major. n. sp.

a, Head scales ; b, lateral head scales.

apex ; antennae brown and the basal joint testaceous, also the base of the second joint.

Thorax deep brown, with narrow-curved hair-like golden scales, with a silvery patch in front of the scutellum ; scutellum brown, with black border-bristles (denuded) ; pleurae testaceous and black, with white scales.

Abdomen brown, with large blackish-brown scales, some ochraceous ones basally on some of the segments and white ones laterally ; venter ochraceous basally, each segment with a broad ochraceous basal band, then an irregular band of white, and then a few black scales.

Legs deep brown, banded and spotted with white ; coxae of the fore and mid legs dark, of the hind pale, femora deep brown, with irregular bands of white, most prominent on the hind legs, and five in number ; tibiae deep brown, with small white spots, five on the fore tibiae, six or more on the mid and hind ; fore metatarsi with a basal white band and also a median one, first and second segments with basal white bands, the last two unbanded ; the mid legs much the same, the hind legs with all the tarsi basally banded ; unguis equal and simple.



Fig. 146.
Wing of *Mansonia major*. ♀. n. sp.

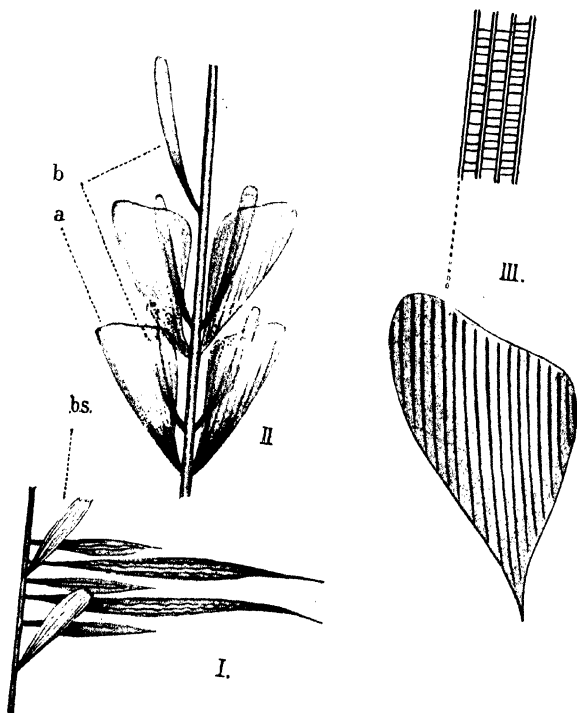


Fig. 147.
Wing scales of *Mansonia major*. n. sp.
I, Fringe; bs, border scales; II, vein scales; a, *Mansonia* scales;
b, narrow scales; III, *Mansonia* scales enlarged.

Wings with the veins densely clothed with *Mansonia* scales, the third and fifth long veins with underlying *Taeniorhynchus*-like scales, the scales are mostly dark, but many pale ones are dotted about; border-scales of *Taeniorhynchus* form; first sub-marginal cell longer and narrower than the second posterior cell, its base a little nearer the apex of the wing than that of the second posterior cell, its stem less than one-third the length of the cell; the posterior cross-vein from two and a half to three times its own length from the mid cross-vein. Halteres with ochraceous stem and fuscous knob.

Length.—6.5 mm.

Habitat.—Bahr el Ghazal, Central Africa (Capt. Cummins, R.A.M.S.).

Observations.—Described from a single ♀ somewhat damaged, but so marked from the other African *Mansonia* that I have ventured to describe it; although the specimen is squashed, all the scaled structure is apparent, except on parts of the abdomen. It can at once be told by the golden-brown scaled thorax, with a pale silvery patch in front of the scutellum. It is also much larger than *M. uniformis* and has the first sub-marginal cell considerably longer in proportion. The border scales are all dull yellow, and so again differ from *M. uniformis*.

MANSONIA TITILLANS. Walker.

Panoplites titillans. Walker.

Culex titillans. Walker.

(Mono. Culicid. II., p. 173, 1901, Theobald.)

Additional localities.—Trinidad, at Cedros (C. W. Hewlett); Jamaica (Grabham); Antigua (W. R. Forrest) 3.1.00; Welldad, British Guiana (Low).

MANSONIA UNIFORMIS. Theobald.

Panoplites uniformis. Theobald.

Panoplites Africanus. Theobald.

Panoplites Australiensis. Giles.

(Mono. Culicid. II., p. 180, 1902 (*uniformis*), and II., p. 187 (*Africanus*); Handbk. Gnat., 2nd ed., p. 355, Giles (*Australiensis*).

Note on synonymy.—The specimens originally described from Southern India under the name *uniformis* were more or less

worn and faded specimens, for all recent material from there and Ceylon shows the thorax to be ornamented. Careful examination has shown the African specimens I described as a distinct species, owing to the marked thoracic ornamentation, under the name *Africanus*, to be the same as those from India. A worn specimen was at the same time sent from Australia, which was in too bad a condition to attempt to differentiate. This specimen was described by Colonel Giles as *P. Australiensis*. Fresh Australian material in the form of two perfect ♀'s have since been received from Dr. Bancroft; these show it to be identical with the Indian and African specimens, with a few minor exceptions. The name *Australiensis* must therefore sink as a variety only of *uniformis*, characterised as follows:—

Variety *Australiensis*; like the type, only there is a median silvery grey scaled line in the mid brown area of the thorax, and there are more pale areas to the fore tibiae. The insects are also somewhat larger, but there are no structural peculiarities.

Habitat.—South Queensland, Australia (Dr. Bancroft).

Additional localities for type.—Uganda, Central Africa (Dr. Moffat, per Dr. Daniels, Dr. Low, Dr. Christy, etc.); Fort Johnson, Zomba, British Central Africa (Dr. Gray) 10.3.00; McCarthy Island, Gambia, caught in a bed-room in June, July and August (Dr. Burdett); White and Blue Niles, at Kanessa on the former, at Rosaires on the latter, Sudan; Bahr el Ghazal (Capt. Cummins); Lagos (Dr. Strachan); Jaffna, Ceylon (E. E. Green); Dacca (Lieut.-Colonel Macrae); Perak (Dr. Wright); Touggourt, Algeria (Dr. Chaudoye); Natal, Pinetown Bridge (Major Moir, R.A.M.C.).

Notes.—This seems to be one of the most abundant Central African *Culices*, occurring in numbers around the Albert and Victoria Nyanzas. It is the most common form at Entebbe and along the lake-shore in Uganda and Busoga, writes Dr. Low. It occurs in swamp and forest, and, according to Dr. Moffat, bites there severely. In Natal it is most troublesome during rains. (Moir).

MANSONIA ANNULIFERA. Theobald.

Panoplites annulifera. Theobald.

(Mono. Culicid. II., p. 183, 1901.)

Additional localities.—Dacca (Lieut.-Colonel Macrae) taken in a village cowshed; Perak (Dr. Wright); Singapore (Dr. Durham).

MANSONIA ANNULIPES. Walker.

(Mono. Culicid. II., p. 185, 1901.)

Additional localities.—Dindings, Straits Settlements, in November and December ; Perak (Dr. Wright) ; Kuala Lumpur, Federated Malay States (Dr. Durham).

Note.—Very abundant nocturnal species in Perak.

SUB-FAMILY AEDEOMYINA.*

GENUS 28. **DEINOCERITES**. Theobald.

BRACHIOMYIA. Theobald.

(Mono. Culicid. II., p. 215, 1901 (*Deinocerites*), and p. 343 (*Brachiomyia*).

A great deal of fresh material has been received from Dr. Grabham dealing with the genus *Deinocerites*. This necessitates remodelling the genus ; the specimens from which it was described, although apparently perfect, have proved not to be so, and the ♂ sent with the ♀'s was a ♂ *Culex* and not a ♂ *Deinocerites*.

The ♂ is of *Aedes* type, and thus the genus comes in the *Aedeomyiinae* and not the *Culicinae*. The notes on the life-history have nearly all been sent me by Dr. Grabham. The genus *Brachiomyia* (Mono. Culid. II., p. 343) was separated from *Deinocerites* on account of the densely-scaled antennae and the different relative length of the antennal joints. Recent perfect material has shown that the antennae of *Deinocerites* are also scaled, so that the genus *Brachiomyia* must sink under *Deinocerites* ; this shows the importance of describing these insects only from perfect material.

Characters of the Genus.

Head clothed with narrow-curved and upright forked scales ; thorax and scutellum with narrow-curved scales ; palpi short in both sexes, scaled, slightly longer in the ♂ than in the ♀ ; antennae moderately long in the ♀, the basal joint nude except for a few hairs on its inner side, second joint very long, equal in length to the three following joints or nearly so, scaly, other joints finely pilose ; in the ♂ the antennae are very long, filiform and pilose, longer than the whole body, the second joint long, as long as the two following joints ; the joints gradually become shorter towards the apex of the antennae, the first four or more joints of the flagellum are scaly ; in life the apical joints of the

* This is spelt *Aedinae* by Blanchard.

antennae are swollen ; they are 14-jointed. Proboscis scaly, apex expanded, not as long as the antennae. Venation as in *Culex*, the fork-cells rather long ; scales (Plate D., Vol. Plates) rather large. Legs with the fore and mid femora large, unguis of ♀ equal and simple, in the ♂ the fore and mid slightly unequal, the larger uniserrated and much curved in the fore legs ; the smaller simple ; the larger uniserrated in the mid legs, the smaller simple ; hind unguis equal and simple.

The essential characters of the genus are the long scaly antennae, especially the elongated second joints and the pilose nature of the feelers in the ♂.

So far the genus is only represented in the West Indies by probably two species. It is certainly the most aberrant genus in the *Culicidae*, both in structure and habits.

DEINOCERITES CANCER. Theobald.

(Mono. Culicid. II., p. 215, 1901, Theobald.)

♀. Head blackish-brown, with grey curved scales, sometimes with a creamy tinge in front, upright forked scales

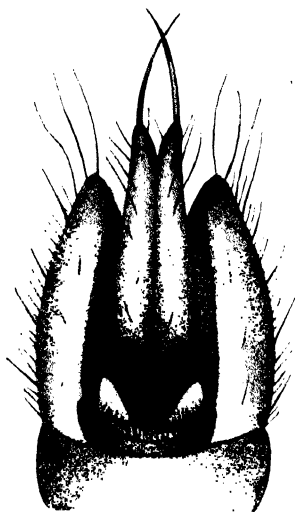


Fig. 148.

External sexual apparatus of ♀
Deinocerites cancer, Theobald.

ochraceous to pale brown, bristles black ; antennae brown, basal joint bright testaceous to yellow, with a few short hairs on the inside, base of the second joint also pale testaceous to yellow, second joint equal in length to the three following joints, the second joint with small brown scales, remainder with thick, short hairs and black verticillate ones ; palpi covered with chocolate brown and a few grey scales ; clypeus bright chestnut-brown, nude ; proboscis brown, almost black towards the apex, slightly expanded apically ; eyes black.

Thorax black, paler towards the scutellum in some specimens, covered with narrow-curved bronzy scales, which have a greyish tinge pos-

teriorly in certain lights, with two rows of black bristles ; scutellum brown, with a grey sheen in some lights, with narrow

curved black scales and black border-bristles; metanotum deep purplish-brown, paler in some specimens; pleurae varying from pale chestnut-brown to pale ochraceous.

Abdomen steely-black with deep umber brown scales, which have violet reflections, no trace of banding or lateral spots; posterior border-bristles pale golden, short; venter pale ashy-grey.

Legs unbanded brown, covered with brown scales, with bronzy and yellowish reflections; coxae pale ochraceous grey; femora pale beneath; hind metatarsi a little shorter than the hind tibiae; unguis equal and simple, rather narrow.

Wings with brown scales, those on the second long vein and its fork clavate, those on the remainder more truncated, the third, fork of the fourth and upper branch of the fifth with longer lateral ones; first sub-marginal cell long, its stem varying from one-fourth to a little more than one-third the length of the cell, its base nearer the base of the wing than that of the



Fig. 149.

Wing of ♀ *Deinocerites cancer*, Theobald.

second posterior cell, stem of the second posterior cell much longer than that of the first sub-marginal, about two-thirds the length of the cell; posterior cross-vein longer than the mid, rather more than its own length distant from it; halteres with deep ochraceous base, black scaled knob and part of the stem.

Length.—3·5 to 4·5 mm.

♂. Antennae much longer than in the ♀, considerably longer than the whole body and much longer than the proboscis, not plumose, as in other *Culicidae*, but distinctly pilose; the second joint equal in length to the two following joints.

Wings with the fork-cells long, the first sub-marginal longer, but about the same width as the second posterior, its base nearer the base of the wing than that of the latter, its stem about one-half the length of the cell, stem of the second posterior

cell as long as the cell; posterior cross-vein nearly twice its own length distant from the mid cross-vein; scales on the



Fig. 150.

Wing of *Deinocerites cancer*. ♂. Theobald.

branches and stem of the second long vein, and on the fifth and sixth veins larger than those of the other veins; genitalia (fig. 151) with the claspers with two apical, short, curved teeth.

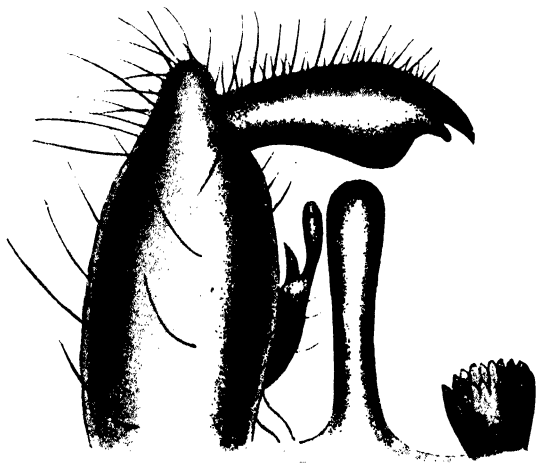


Fig. 151.

Male genitalia of *Deinocerites cancer*. Theobald. (One clasper only.)

Ungues of the fore and mid legs unequal, the fore with one uniserrated, much curved and thicker than the other, which is slightly longer and simple; in the mid legs the larger is uniserrated and the smaller simple, both much curved; hind unguis rather long, simple, thin and curved.

Length.—4 to 5 mm.

Habitat.—Kingston, Jamaica, and other parts of the island (Dr. Grabham); St. Lucia (Dr. Low, Dr. St. George Gray, and

Otto Galgey); St. Vincent; Barbados; British Guiana (Dr. Low).

Time of capture.—May and June in Barbados; July and November in St. Lucia; February, March, July, in Jamaica.

Life-history and Habits.

This is essentially a "crab-hole" breeding form. The water in these holes is distinctly brackish. The larvae are found in the water at the bottom of these crab-holes near the sea; these holes are long winding passages, sometimes three or four feet long, and only about four inches in diameter. Dr. Grabham has noticed that the females fly about in the breeding jars, but the males never seemed to wander far from the surface of the water, and this probably accounted for no males being taken, only females being found at the entrance to the holes. The larvae, parts of which are figured (Figs. 152 and 153), closely resemble *Culex* larvae, but the head presents various modifications. When alive the hairs on the thorax and abdomen are quite black, giving the larvae a singular appearance.

Dr. Grabham writes that the antennae in both sexes are much shrunken and distorted in pinned specimens; in living specimens they are held stiffly in front, somewhat arched downwards; they are in constant movement, exploring the surface as the insect crawls, the movement seems to be effected at the basal joints; in living specimens the ♂ terminal joints are seen to be somewhat thicker than those lower down. It seems as if the hairs on the terminal joints are erectile. On the end of the second joint are a number of peculiar sense organs which are probably olfactory (Giles).

Dr. Low writes regarding the habits of this species in Barbados as follows:—"I found them in crab-holes at the side of a pond, but none in the pond itself. Many insects flew out of the holes when disturbed. They are sluggish in flight, and when disturbed fly slowly from one hole to another adjoining. I kept a lot in captivity, but could never get them to bite. In many dissected from Calliagua, a village in St. Vincent, I never saw any traces of blood in their stomachs."

Dr. Low sent me a ♂ *Culex* as a ♂ of this species, just as Dr. Grabham did at first.

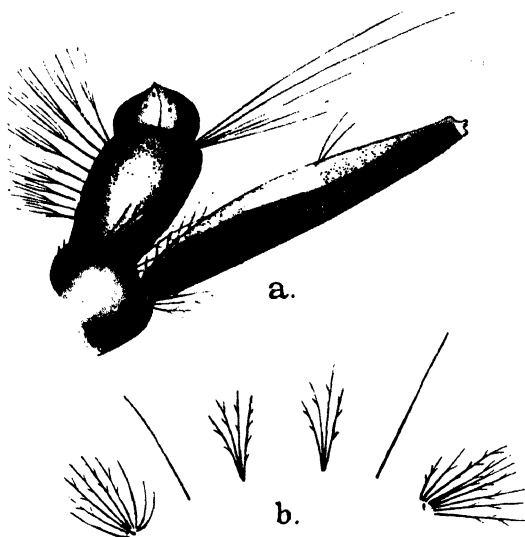


Fig. 152.

Deinocerites cancer. Theobald.

a, Anal extremity of larva ; b, frontal hairs of larva

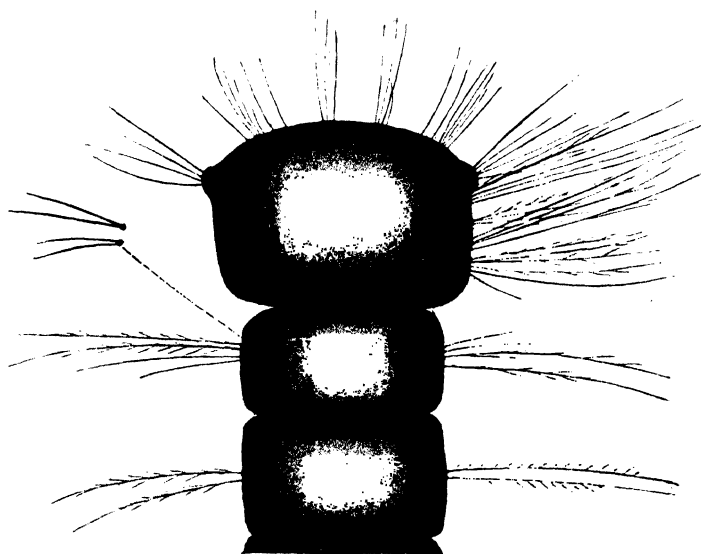


Fig. 153.

Thoracic segments of larva of *Deinocerites cancer.*

Larva.—Grey with a dark, median line, head chestnut-brown, siphon brown, thick, as long as the two preceding segments and the segment upon which it is situated. The frontal hairs are as shown in fig. 152, b. The abdomen is composed of nine segments and terminates in a round knob (fig. 152, a); the siphon is on the eighth segment. The first thoracic segment has numerous simple hairs in front and two pairs of bunches of plumose hairs arising from conical papillae on each side (fig. 153); the second segment has four lateral hairs, two long and plumose, and two short, the third to sixth with a pair of finely plumose hairs on each side, the seventh with a single long hair. The siphon and the chaetotactic characters of the apex are shown in fig. 152.

Length.—6 mm.

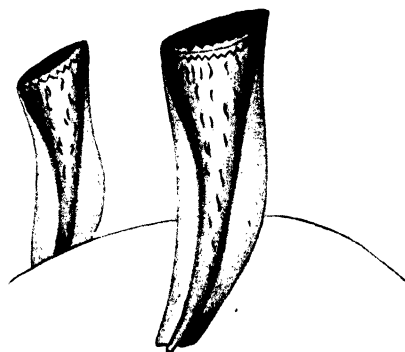


Fig. 154.

Deinocerites cancer. Theobald.

Siphons of the pupa.

Pupa.—The pupa has truncate siphons, very like *Culex*, and two anal fins.

GENUS 29. **FINLAYA.** nov. gen.

(Plate XIII.)

Head clothed with flat scales, broad curved scales and numerous narrow upright forked ones, and long forwardly projecting bristles; the broad curved scales border the eyes and form a median line; the flat scales not so closely applied as in *Stegomyia*. Eyes with facets very large and pronounced; antennae with the basal and second joint scaly, fifteen-jointed in

the ♀; palpi densely scaly, apparently four-jointed. Mesothorax with narrow-curved scales; prothoracic lobes with flat scales; scutellum with flat scales and a basal row of narrow-curved ones. Abdomen densely clothed with flat scales, the apical segments with *ventral scaly tufts*. Legs with the femora with rather prominent scaly tufts; unguis equal and simple. Wings spotted with light and dark scales; scales large and broad, more or less pyriform in shape.

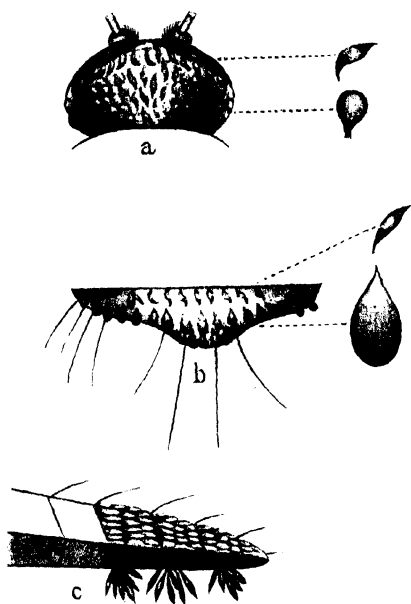


Fig. 155.

Genus *Finlaya*, nov. gen. (*F. poicilia*).

a, cephalic; b, scutellar, and c, abdominal squamose armature.

Two species occur in the genus, namely, *Culex Kochii*, Dönitz, from New Guinea, and the one described here. From the two females I have seen it is not possible to say whether the genus comes in the *Culicina* or the *Aedeomyina*. The specimens bear some resemblance on the one hand to *Aedeomyia* and on the other to *Culex*. The presence of four median scutellar bristles favours this being one of the *Aedeomyina*.

The form of the wing scales at once separates it from other

genera. The most marked character in the genus is the presence of three ventral abdominal scale tufts.

Nothing seems to be known of their life-history.

I have named this genus after Dr. Finlay, the originator of the yellow-fever mosquito theory.

FINLAYA POICILIA. n. sp.

Head black, with some grey scales ; palpi black, with snowy white apex ; proboscis black, with a white band ; thorax black, with narrow-curved grey scales ; pleurae blackish-brown spotted with white ; abdomen black, the segments with two white dorsal spots and white lateral spots ; legs black, banded with white ; wings covered with black and white scales, the costa with three small and two larger white spots.

♀. Head black, covered at the sides and on to the occiput with flat black scales grey at the sides, the central area with broad silvery grey scales and the eyes bordered with the same, a few upright black narrow forked scales dotted over the occiput. Antennae dark brown, basal joint with silvery white scales on the inside, the second joint densely clothed with black scales ; palpi prominent, deep black, with silvery white scales at the apex ; proboscis black, with a clear white band at the base of the apical half and a trace of white banding at the apex.

Mesothorax black, with narrow-curved dull grey and white scales (partly destroyed by the pin), and patches of flat, silvery white scales at the sides in front of the wings ; prothoracic lobes covered with flat white scales ; scutellum covered with flat, rather pyriform black and white scales on the middle lobe and with black ones on the lateral lobes, the base of the scutellum with silvery white narrow-curved scales, median lobe with four border-bristles ; pleurae blackish-brown to almost black, with silvery white puncta.

Abdomen black, each segment with two median white spots, the last two segments mainly grey scaled ; there are also median white lateral spots ; the apical segments with three prominent ventral tufts of black scales.

Legs black, the femora with five snow-white bands, the tibiae with six similar bands, metatarsi apically and basally white banded and with a median white band ; first fore tarsus apically white, next two black, last pure white ; in the mid legs the

same; in the hind legs two tarsi with white bands, the last pure white; unguis small, equal and simple.

Wings clothed with large, broad, pyriform black and white scales, the costa with two small apical, then two large and then another small white spot; the veins mostly covered with black

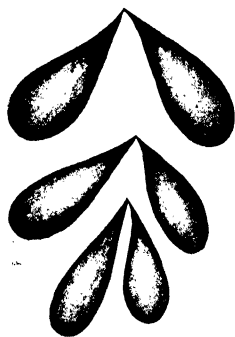


Fig. 156.

Wing scales of genus *Finlaya*.

scales, but with white areas as follows: At the base of the fork-cells, small areas on their branches, four on the third long vein; two on the upper, two on the lower branch of the fifth, and three on the stem, the basal portion being white; four small white areas on the sixth; fringe black, with white spots where the veins join the border; border-scales all black; first sub-marginal cell a little longer, but about the same width as the second posterior cell, bases of the two fork-cells about level, stem of the first sub-marginal not quite as

long as the cell, stem of the second posterior as long as the cell; posterior cross-vein nearly four times its own length distant from the mid cross-vein; halteres black.

Length.—4.5 mm.

Habitat.—Penang (Dr. Freer).

Time of capture.—24.10.1901.

Observations.—Described from a single specimen with only four legs, but otherwise perfect except for the denudation of the mesothorax. It bears some resemblance to Dönitz's *Culex Kochi*, which comes in this genus, but is quite distinct. There is no species with which it can be confused; the dark spotted wings suggest at first *Anopheles Jamesii*, mihi, or *Cycloleppipteron medio-punctulatus*, n. sp.

FINLAYA KOCHI. Dönitz.

Culex Kochi. Dönitz.

(Mono. Culicid. II., p. 317, 1901.)

This species evidently comes in this genus, but the only specimen I have seen is much damaged and the wing scales partly denuded. The abdominal scaly tufts are very noticeable. It is anyhow not a *Culex*.

GENUS 30. **AEDES.** Meigen.

(Mono. Culicid. II., p. 224, 1901.)

Some of the species described as *Aedes* in the previous volume are now excluded and placed in separate genera. The characters of true *Aedes* are as follows:—

Head clothed with narrow-curved scales on the middle, flat ones laterally, which spread much further on to the occiput than in *Culex*; the narrow-curved scales often forming only a broad median line. Scales of the mesothorax narrow and curved, or

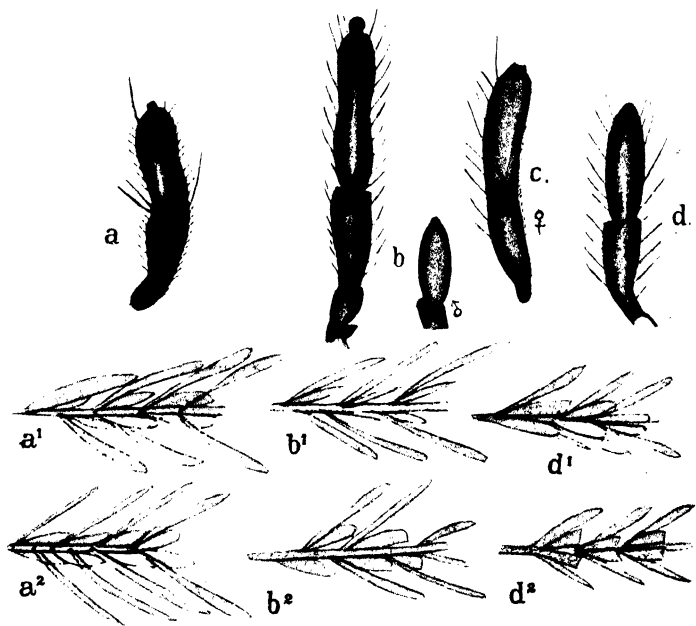


Fig. 157.

a, *Skusea funerea*, Theobald. ♀ palp; a¹, wing scales first fork-cell; a², on third long vein
 b, *Aedes fuscus*, Osten-Sacken. ♂ and ♀ palp; b¹ and b² as in a.
 c, *Howardina Walkeri*, Theobald. ♀ palp.
 d, *Verrallina Butleri*, Theobald. ♀ palp; d¹ and d² as before.

almost hair-like; scutellum with narrow-curved scales; metanotum nude. Scutellum with six bristles on the mid lobe. Wing scales much as in *Culex*, the lateral ones long and thin, the median ones small and flat; fork-cells moderately long, about one-fourth the length of the wing.

Palpi small in both sexes, two-jointed in the ♂ ; four-jointed in the ♀ , the apical joint minute, mammilliform, penultimate joint long, and there are traces of a fifth joint.

The related genera are tabulated here for reference :—

1. Head clothed with narrow-curved and flat scales.
Mid lobe of scutellum with six border-bristles.
 - (a) Scutellum with narrow-curved scales.
Palpi in ♀ four-jointed (quasi five-jointed), in ♂ two-jointed *Aedes*.
Mid lobe of scutellum with four border-bristles.
Palpi in ♀ four-jointed, apical joint minute *Howardina*.
 - (b) Scutellum with flat scales *Aedimorphus*.
2. Head clothed with flat scales only.
Mid lobe of scutellum with six border-bristles.
Palpi of ♀ three-jointed (quasi four-jointed) *Skusea*.
Mid lobe of scutellum with four border-bristles.
Palpi of ♀ two-jointed: small, dark species *Verrallina*.

AEDES FUSCUS. Osten-Sacken.

(Mono. Culicid. II., p. 226, 1901.)

The larvae of this species has been found by Mr. J. Turner Brakeley, of Hornerstown, New Jersey, in the pitchers of the Pitcher Plant (*Sarracenia*).

The ♀ palpi are quasi five-jointed, but the two basal joints are, I fancy, only apparent ; the ♂ palpi seem to show a minute apical joint, mammilliform in appearance.

I have only seen two species that come in this genus, viz., *fuscus*, Osten-Sacken, and *cinereus*, Meigen.

I have only had one ♂ to dissect, and, from the preparation of the palpi made from it, I cannot say for certain if there is a small third apical joint or not, as the scales partly obscure the apex.

The genus *Aedes* is only represented so far in Europe and North America.

GENUS 31. **HOWARDINA.** nov. gen.

(Plate XV.)

Head clothed with flat and narrow-curved scales, the latter forming a median area as in *Aedes*. Scutellum with narrow curved scales; the mid lobe with four posterior border-bristles. Wings with the lateral vein-scales large for the size of the wings, long, rather thin, the median vein-scales small. Palpi of ♀ minute, four-jointed; the penultimate joint long, longer than the two basal ones; apical joint very minute.

♂ unknown.

All small species, and with ornamented thorax. Two species known, *Walkeri* and *Greenii*, n. sp.

The genus occurs in the West Indies and Ceylon.

HOWARDINA WALKERI. Theobald.

Culex (Stegomyia ?) Walkeri. Theobald.

(Mono. Culicid. I., p. 424, 1901.)

Head (Fig. 158) with a median line of silvery white scales, then a dark brown and then pale brown areas. Proboscis long, deep brown. Thorax deep rich brown, with a lateral broad silvery-white area and two median golden scaled lines running parallel in front and converging to form a single line behind, and two other lines not reaching the front of the mesothorax.

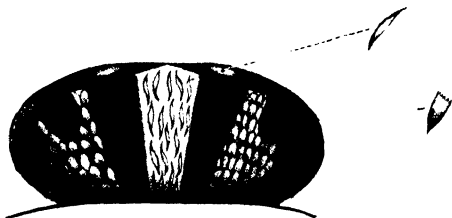


Fig. 158.

Head of *Howardina Walkeri*. ♀. Theobald.

Abdomen deep brown, with some basal creamy median patches. Fore and mid legs unbanded; hind with metatarsi and tarsi, with basal white bands.

♀. Head brown, with a broad median line of silvery white curved scales, then a broad area of small flat dark ones, and then dull brownish-ochraceous ones, with a small dark area near the

eyes ; a patch of black upright forked-scales near the nape ; palpi small, deep brown ; proboscis deep brown ; basal joint of antennae deep brown inside, testaceous outside.

Thorax brown, clothed with narrow-curved scales, giving it a rich brown appearance, and ornamented as follows : A broad

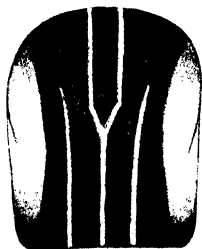


Fig. 159.

Howardina Walkeri. Theobald.
Thorax.

lateral area of silvery white curved scales, very dense and closely applied to the tergum, two narrow median parallel golden scaled lines in front, converging to form a single line behind, not quite reaching the bare space in front of the scutellum, and a pale line on each side not reaching the front of the mesonotum ; in front of the scutellum is a patch of rather broad curved creamy scales and very narrow-curved deep brown ones ; scutellum brown, with narrow-curved brown scales (partly denuded) ; metathorax black ; pleurae bright brown, with five silvery white spots ; prothoracic lobes with silvery white scales ; thoracic bristles dark in front, golden behind.

Abdomen black, with black scales, the first and second segments unadorned, the third, fourth, fifth, and sixth with median creamy basal patches, the last two segments with basal silvery-white scales ; the segments with lateral silvery spots, those at the base extend along the whole side of the segments, the apical segments with the patches basal ; venter pale scaled at the base ; the other segments with basal pale bands, narrowest on the apical segments.

Legs (broken), fore and mid pair deep brown, unbanded ; venter of the femora pale creamy in all the legs, the metatarsi of the hind legs with a broad white basal band (probably also the tarsi). Coxae pale. Ungues equal and simple.

Wings with brown scales, the lateral ones long and thin ; fork-cells small ; first sub-marginal a little longer, but no narrower than the second posterior cell, its stem more than half the length of the cell, its base slightly nearer the base of the wing ; stem of the second posterior nearly as long as the cell ; posterior cross-vein more than its own length behind the mid cross-vein. Halteres with pale stem and fuscous knob.

Length.—2·5 mm.

Habitat.—Jamaica (Dr. Grabham).

Time of capture.—May.

Observations.—A single damaged specimen was placed under the name *Culex fasciatus* in the old collection at the Museum, and is recorded in Vol. I., p. 424.

Dr. Grabham recently sent me a perfect ♀ from Jamaica, which shows it to belong here and not to the *Culicina*. It is evidently rare—a single female only having been found by Dr. Grabham.

HOWARDINA GREENII. n. sp.

(Plate XV.)

Head brown, with narrow-curved pale golden scales ; thorax brown, ornamented with brilliant golden curved scales, forming a narrow median line, and lateral masses ; pleurae brown, with silvery scales. Abdomen brown, with basal dull creamy grey bands. Legs deep brown, the mid and hind metatarsi with a narrow basal white band. Fork-cells rather small.

♀. Head brown, with a small patch of narrow-curved pale golden scales in the middle and upright forked scales of a deep ochraceous hue behind, flat ochraceous and black scales over the greater part of the head, the flat ochraceous ones forming a posterior patch between the narrow-curved and flat black ones and sending a few pale ones outwards to the eyes ; palpi small, black ; antennae black, basal joint and base of second joint testaceous and black ; proboscis black.

Thorax black, with rich chestnut brown narrow-curved scales and ornamented in front with light golden narrow-curved scales, arranged in a narrow median line and scattered irregularly on



Fig. 160.

Head of *Howardina Greenii*. n. sp.

the sides ; scutellum paler, with black and golden narrow-curved scales, with four bristles to the median lobe ; metanotum brown ; pleurae deep brown, with four patches of white scales.

Abdomen deep brown, with narrow curved creamy yellow basal bands.

Legs brown, pale ochraceous towards the base, mid and hind metatarsi with a narrow pale basal band; fore and mid ungues equal, uniserrated.

Wings with the fork-cells short, the first sub-marginal a little longer and slightly narrower than the second posterior cell, its base very slightly nearer the base of the wing; its stem nearly two-thirds the length of the cell; stem of the second posterior

as long as the cell; posterior cross-vein about one and a half times its own length from the mid cross-vein; halteres with ochraceous stem and fuscous knob.

Length.—3 mm.

Habitat.—Peradeniya, Ceylon (Green).

Time of capture.—February.

Observations.—Described from a single specimen. The bright golden scaled ornamentation on the thorax and the metatarsal banding should easily separate it.

Fig. 161.

Howardina Greenii. ♀.
n. sp.

GENUS 32. **AEDIMORPHUS.** nov. gen.

Head clothed with flat scales over most of its surface, with narrow-curved ones behind. Scutellum with *flat scales* and eight (?) border-bristles; mesothorax with curved hair-like and narrow-curved scales; metanotum nude. Fork-cells moderately long; first sub-marginal longer than the second posterior cell; many of the lateral vein-scales long and broad.

A single species only occurs, which I provisionally placed in *Uranotaenia*, viz., *U. domestica*.

The genus differs from others near *Aedes*, in (1) the presence of mixed head scales and flat scutellar ones, and (2) in the *Uranotaenia*-like appearance of the thorax, but differs from the latter in having long fork-cells and no flat thoracic scales.

AEDIMORPHUS DOMESTICUS. Theobald.

Uranotaenia domestica. Theobald.

(Mono. Culicid. II., p. 253, 1901.)

A figure of the ♀ wing is given. The types are in the Liverpool School of Tropical Medicine; and no fresh specimens have arrived.



Fig. 162.

Wing of ♀ *Aedimorphus domesticus*. Theobald.

GENUS 33. **SKUSEA.** nov. gen.

Head with flat scales all over; scutellar scales narrow and curved. Metanotum nude. Branches of the first sub-marginal cell with denser scales than the rest of the veins, thick, like those of *Verrallina*, also those on the branches of the second fork-cell and its stem; scales on the basal areas of the veins thick. Palpi of ♀ three-jointed, longer than in *Verrallina*. Scutellum with six border-bristles to the mid lobe.

♂ unknown.

Closely allied to *Verrallina*, but easily told by the different wing scales, and three-jointed palpi, and larger size, more resembling true *Aedes* in appearance, and having, like that genus, six posterior border-bristles to the mid lobe of the scutellum.

This species includes three species: two (*funerea* and *multiplex*) from Australia, and one (*Pembaensis*) from Africa.

Some eggs (Fig. 163) were found attached to a specimen of *multiplex*, and may belong to this genus.

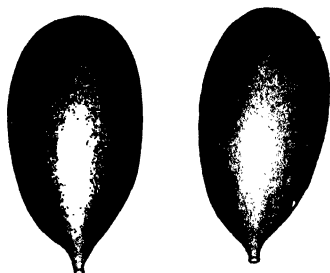


Fig. 163.

Ova of *Skusea multiplex* (?).

SKUSEA FUNEREA. n. sp.

Head and thorax dark brown, the latter with deep bronzy brown narrow-curved scales. Abdomen black, with narrow white bands which spread out to form lateral white spots, the white bands not basal, but on basal half, the banding absent on the last two segments, the lateral white spots prominent. Legs dark brown, unbanded, bases and venter of femora pallid.

♀. Head covered with flat black scales, with violet reflections; palpi, clypeus and proboscis black, palpi short, scaly and bristly; antennae dark brown, basal joint dark, nude, second joint testaceous at the base.

Thorax black, with long curved hair-like bronzy scales and numerous black bristles, which are dense over the roots of the wings, there are also median and lateral rows on the mesothorax; scutellum dark brown, with narrow pale dull golden curved scales and numerous dark border-bristles; metanotum black; pleurae black, bristly, with patches of white scales, three prominent.

Abdomen with peculiar ornamentation, deep brown, banded with black and white; first segment entirely deep brown, with violet reflections, second segment deep brown, a few white scales in the middle close to the base, but not basal, lateral white spots not quite basal; in the third, fourth, fifth and sixth segments the bases are banded with darker brown, almost

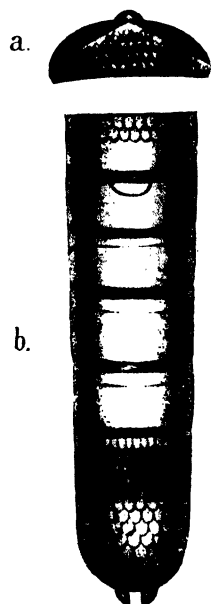


Fig. 164.

Skusea funerea. n. sp.
a, head; b, abdomen.

black, and then follows an irregular white band which spreads out laterally to form distinct lateral white spots, seventh segment with lateral white spots only, apex black; the whole abdomen shows violet reflections in some lights; posterior border-bristles pale dusky brown; venter also with white bands on the basal half of the segments.

Legs dark brown to black, coxae and bases and venter of femora pale; fore, mid and hind ungues equal and simple, the fore rather straighter than the mid; legs rather bristly, femora somewhat enlarged.

Wings with the veins brown scaled, the upper border dark, slightly smoky; fork-cells rather short; first sub-marginal cell longer, but no narrower than the second posterior cell, its base a little nearer the base of the wing, its stem about half the length of the cell; stem of the second posterior cell about as long as the cell; posterior cross-vein from one to one and a half times its own length distant from the mid cross-vein. Halteres with pale stem and fuscous knob.

Length.—4 mm.

Time of capture.—April.

Habitat.—Queensland (Dr. Bancroft).

Observations.—A very distinct *Aedes*, told by the white abdominal banding, which looks basal to the naked eye, but which is separated from the base of the segments by a darker basal band.

It resembles *V. Butleri* and *V. nigricorpus*, but can be told from the former by the simple unguis, from the latter by the white abdominal fascia. Dr. Bancroft has sent over a series of the species. The types are deposited in the British Museum collection.

SKUSEA MULTIPLEX. n. sp.

Head black, with paler scales in the middle and yellow ones at the sides. Thorax dark brown, with hair-like curved bronzy black scales over the surface and two paler patches of narrow-curved scales, extending more or less across the mesonotum. Abdomen blackish, with bright border-bristles, giving it a quasi-banded appearance, and with lateral basal white spots. Legs black, unbanded; fore and mid unguis of the ♀ equal and uniserrated.

♀. Head covered with flat scales of a deep brown to black colour with violet reflections, ochraceous in the middle, at the sides and around the eyes, and with numerous black upright forked

scales behind; clypeus, palpi and proboscis black; antennae deep brown, basal joint and base of the second joint testaceous.

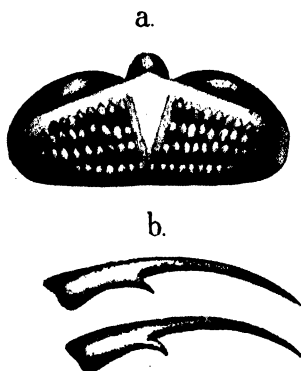


Fig. 165.

Skusea multiplex. n. sp.
a, head; b, fore unguis of ♀.

Thorax deep testaceous brown, covered with hair-like curved bronzy black scales, a more or less irregular band of narrow curved creamy to ochraceous ones running across the mesonotum; in some lights the scales, except the pale ones, appear quite black; scutellum deep brown, testaceous at the base, with hair-like black and narrow-curved creamy scales, six large black posterior border-bristles to the mid lobe; metanotum testaceous brown; pleurae shiny brown, with a few pale scales and golden bristles.

Abdomen black, covered with black scales with violet reflections, posterior border-hairs pale, giving a quasi-banded appearance in some specimens, and with white basal lateral spots, venter with basal pale, almost white bands.

Legs dark brown, almost black, unbanded; coxae pale, also the base and venter of the femora; fore and mid unguis rather small, equal and uniserrated, the teeth very small; femora, tibiae and metatarsi with a few spines; femora rather swollen.

Wings with the fork-cells rather short and with brown scaled veins. First submarginal cell longer and narrower than the second posterior cell, its base slightly nearer the base of the wing than the base of the latter, its stem a little more than half the length of the cell; stem of the second posterior not quite as long as the cell; cross-veins rather pale, the posterior about its own length distant from the mid or a little less; the supernumerary cross-vein is longer than the mid, but not quite so long as the posterior cross-vein; halteres with ochraceous stems and fuscous knobs with a few grey scales.

Length.—4 mm.

Habitat.—Queensland (Dr. Bancroft).

Time of capture.—May.

Observations.—Described from three ♀'s, one showing traces of basal pale abdominal bands. It comes very near *funerea*, but can at once be told by the head not being all black and by the unguis being uniserrated. It seems subject to considerable variation, judging from the three specimens sent me by Dr. Bancroft.

GENUS 34. **VERRALLINA.** nov. gen.

Head covered entirely with flat scales; scutellum with narrow curved scales; metanotum nude. Scutellum with four border bristles to the median lobe. The lateral scales of the first fork-cell broader and rather shorter than in *Aedes*, and densely packed together, the median scales of the veins larger and more pronounced (fig. 157, d, 1). Palpi very short in the ♀, two-jointed, with a trace of a third basal joint, the apical joint large (d).

Small dark species, with rather short broad wings.

♂ unknown.

Differs from *Aedes* in having the head entirely covered with flat scales and in the palpi being fewer jointed.

Three species are included so far in this genus, viz., *Butleri*, Theobald; *nigricarpus*, Theobald; and *nigra*, Theobald, and possibly Coquillett's new species.

These small dark gnats are rather vicious biters, and occur in the Malay Peninsula, South America and West Africa.

VERRALLINA BUTLERI. Theobald

Aedes Butleri. Theobald.

(Mono. Culicid. II., p. 230, 1901.)

Additional localities.—Dindings, Straits Settlements; two ♀'s taken in October and December (F. J. Hallifax); Perak (Dr. Wright).

VERRALLINA NIGRA. Theobald.

Aedes niger. Theobald.

(Mono. Culicid. II., p. 237, 1901.)

This species also comes in this genus.

AEDES (VERRALLINA ?) SMITHII. Coquillett.

The following is Coquillett's description :—

Black, the pleura largely, venter, bases of halteres, coxae and bases of femora yellow, scales of upper sides of body dark brown; some on the abdomen having a violaceous reflection, scales of femora black, those on the under side light yellow, scales of hind tibiae black, those on the inner

side and on the front and middle tibiae and their tarsi light yellow, tarsal claws simple; wings hyaline, first sub-marginal cell nearly twice as long as its petiole.

Length.—3 mm.

Two males and three females bred from material received from Prof. J. B. Smith, after whom the species is named. Type No. 5799, U.S. National Museum.

Habitat.—Lahaway, New Jersey.

This species was compared with the type of *Aedes fuscus* and found to be very distinct, being easily told by the absence of abdominal pale scaled bands.

Note.—I have not seen this species and do not know if it comes in the genus *Aedes* or some of the new related genera. It most likely occurs in *Verrallina*.—F. V. T.

GENUS 35. **FICALBIA.** nov. gen.

Intermediate between *Skusea*, *Verrallina* and *Uranotaenia*.

Head clothed entirely with flat scales, with a few short upright forked ones behind; palpi very short, two-jointed; proboscis rather long, swollen apically. Thorax with narrow-curved scales, no flat ones as seen in *Uranotaenia*; scutellum covered with flat scales as in the latter genus. Wings with the fork-cells moderately short, the first sub-marginal longer than the second posterior, median wing scales broad and spatulate; upper border of costa with spine-like scales; unguis of the ♂ unequal, simple. Very small species.

Female unknown.

This genus is separated from *Aedes* and *Skusea* on account of the complete flat-scaled structure of the head and *scutellum*, and from *Uranotaenia* on account of the larger and more normal fork-cells and the complete absence of flat scales on the mesonotum.

At present the genus has only occurred in South India and Ceylon and is represented by two species, the females of which are at present unknown.

The two species tabulate as follows:

Abdomen banded	<i>minima</i> .	Theobald.
Abdomen unbanded	<i>simplex</i> .	n. sp.

FICALBIA MINIMA. Theobald.*Uranotaenia minima*. Theobald.

(Mono. Culicid. II., p. 262, 1901.)

This species, which occurs in South India, has not been again received since the second volume of the Monograph went to press, and there are no further notes to add. It is removed from the genus *Uranotaenia*, in which I placed it provisionally on account of the venation and mesothoracic scale ornamentation.

FICALBIA SIMPLEX. n. sp.

Head covered with dark flat scales; thorax dark brown and very bristly; pleurae pale ochraceous; metanotum deep brown in the middle, pale ochraceous around. Abdomen dusky brown, unbanded and unspotted, venter ochraceous. Legs deep brown, unbanded, femora pale at the base and to some extent beneath.

♂. Head covered with flat dusky brown scales, with a violet tinge and with a few small black upright forked scales behind; proboscis black, bent at right angles to the body; antennae brown, basal joint large and globular, black, with a few small curved hairs on the inner side.

Thorax deep brown, with narrow-curved deep bronzy brown scales with numerous large black bristles, especially over the roots of the wings; scutellum covered with flat black scales, those on the lateral lobes forming distinct lateral tufts, median lobe with six border-bristles; pleurae very pale ochraceous; metanotum deep brown in the middle, with a pale ochraceous border.

The abdomen is entirely clothed with dusky brown scales, without any traces of banding or spotting, border-bristles rather pale; venter more or less dull ochraceous.

Legs deep brown, coxae pallid, base and venter of femora pale, especially of the hind legs; unguis of the fore and mid legs very unequal, the larger sickle-shaped and both simple, the hind unguis equal, small and simple.

Wings with short fork-cells, but longer than in *Uranotaenia*; the first sub-marginal longer and very slightly narrower than the second posterior, their bases nearly level, their stems longer than the cells; posterior cross-vein about three times its own length

distant from the mid cross-vein. Halteres with pale stem and fuscous knob.

Length.—2·5 mm.

Habitat.—Ceylon, Kurunegalla (Green).

Time of capture.—September.

Observations.—Described from a single ♂ sent by Mr. Green, in perfect condition. It differs clearly from the South Indian species in (1) having an unbanded abdomen and (2) in the position of the cross-veins. The ♀ is unknown.

GENUS 36. URANOTAENIA. Arribalzaga.

(Mono. Culicid. I., p. 241, 1901.)

This genus seems well established. The larvae and pupae have been found in the West Indies.

URANOTAENIA APICALIS. n. sp.

(Plate XIV.)

Thorax bright brown, with deep brown curved scales and a small blue spot before the scutellum and a line of blue scales at the roots of the wings; a few pale blue scales on the prothoracic lobe and on the median lobe of the scutellum, and some pale blue scales on the head and pleurae. Abdomen brown, with apical pearly-white bands. Wings with a long blue patch on the root of the fifth long vein. Fore and mid legs deep brown, unbanded; in the hind all the joints have apical white spots and the last joint entirely white.

♂. Head with flat black scales and a median patch of pale blue and a small patch on each side; proboscis, palpi and antennae deep brown, basal joint of the latter bright ferruginous.

Thorax bright brown, with narrow-curved brown scales and a patch of flat pale blue scales in front of the root of each wing, and a small spot in front of the space before the scutellum; prothoracic lobes with a few blue scales and long black bristles; scutellum with pale blue flat scales to the median lobe; metanotum brown; pleurae bright brown, with pale blue spots.

Abdomen brown, with apical pale bands, two prominent, and pearly-white.

Legs deep brown, with bronzy reflections, the hind legs with white apices to the joints, the last tarsal all white and the base

also of the penultimate; unguis of the fore and mid legs unequal, much curved, simple, hind equal and simple.

Wings with brown scales, those on the first longitudinal and on the sub-costal large, the lateral ones of the third long vein few and large, lanceolate, a few black smaller ones at its base, those on the branches of the second fork-cell the same; costal border with long black spine-like scales; first sub-marginal cell about half the size of the second posterior, its stem about two and a half times as long as the cell; stem of the second posterior about one-fourth longer than the cell; posterior cross-vein about its own length distant from the mid cross-vein.

Length.—2.5 to 3 mm.

♀. Head with flat black scales and two lateral pale blue (almost white) patches and a blue patch between the eyes; antennae brown, basal joint bright testaceous. Legs, etc., as in the ♂; unguis equal and simple.

Wings with brown scales, the first sub-marginal cell very small, very little more than half the size of the second posterior, its stem three times as long as the cell; stem of the second posterior longer than the cell; posterior cross-vein about two-thirds of its length distant from the mid cross-vein; scales brown except at the base of the fifth long vein, where they are metallic pale blue (yellow under the microscope). The scales on the sub-costal, first and second long veins broad and short and end somewhat asymmetrically; lateral ones on the third, branches of the fourth and apex of the upper branch of the fifth long and lanceolate; at the base of the third is a dark row of short thick scales, those on the remainder of the veins short and thick; the blue basal scaled patch is composed of about a dozen large inflated scales. The hind legs are banded as in the ♂; the fore and mid unbanded.

Length.—2.8 to 3 mm.

Habitat.—Antigua (Forrest).

Time of capture.—January.

Observations.—Described from a series of ♂'s and ♀'s, but the ♂'s only are quite perfect. It comes very near *U. geometrica*, but can at once be told from it by the last hind tarsus only being white, not the last two as in *geometrica*, nor are the apical abdominal bands triangular. The thoracic scales are as in *geometrica*.



Fig. 166.
Wing of *Uranotaenia apicalis*.
n. sp. ♀.

URANOTAENIA PALLIDOVENTER. n. sp.

Head brown, with azure blue on each side; thorax deep bright brown, with a patch of azure blue scales in front and over the roots of the wings and with azure blue prothoracic lobes and similar coloured scales on the pleurae; abdomen deep brown, unbanded, venter deep ochraceous. Legs brown, unbanded.

♀. Head covered with brown flat scales and a small azure blue patch on each side over the eyes and deep violet ones behind; antennae brown, basal joint and base of the second joint bright testaceous; proboscis deep brown. Thorax brown, covered with long thin curved scattered brown scales; black in certain lights and near the scutellum showing up clearly against the bright brown ground of the thorax; the prothoracic lobes covered with flat azure blue scales and also scales of a similar colour over part of the roots of the wings; scutellum brown, with blackish border-bristles, partly denuded, but showing some deep brown flat scales; metanotum bright chestnut-brown, darker at the sides and posteriorly; pleurae deep and pale brown, with some traces of azure blue scales. Abdomen deep brown, unbanded, and unspotted, venter ochraceous. Legs deep brown unbanded, the bases with an ochraceous tinge; unguis small equal and simple.

Wings with rather large lanceolate lateral vein-scales, scales brown except a long patch of azure blue scales at the base of

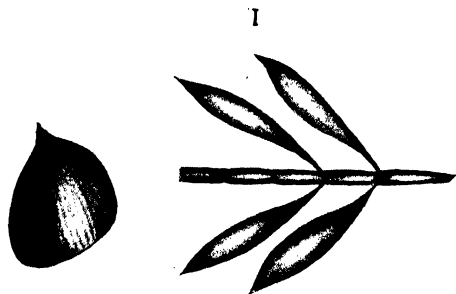


Fig. 167.

Uranotaenia pallidoventer. n. sp.

I, Wing scales; II, flat scale on wing.

the fifth long vein, these scales are broadly spatulate (fig. 167, II); first sub-marginal cell very small; posterior cross-vein longish,

about one and a half times its own length distant from the mid cross-vein; venation practically as in all *Uranotaeniae*. Halteres with pale stem and fuscous knob.

Length.—3·5 mm.

Habitat.—Para, Brazil (Dr. Durham).

Observations.—Described from a single ♀, not in perfect condition. The species is, however, very distinct; the unbanded legs and abdomen, with the pale ochraceous venter, are marked features seen in no other species of this genus.

URANOTAENIA LOWII. Theobald.

(Mono. Culicid. II., p. 339, 1901.)

Additional localities.—St. Vincent (Dr. Low); Para (Dr. Durham); Trinidad (C. W. Hewlett).

Notes and observations.—Dr. Low sends the following note on this species: "The pool already mentioned (see *C. fatigans*) near the cemetery in St. Lucia and small water holes in a meadow behind Kingstown, St. Vincent, were the breeding-ground of this species. The eggs were not detected.

"The larvae agree with description given by Lutz as being intermediate between *Culex* and *Anopheles*. They are small, blackish in colour, and lay at the surface obliquely, approaching the position of an *Anopheles*. A breathing tube could be, however, quite easily detected. They were kept, and the insects developed from them.

"The imagines only lived two days and seemed very delicate. I could not get them to bite. The ones in St. Vincent taken in October were similar. They also soon died, and I failed to get them to bite. The larvae are found in water where *Culex* and *Anopheles* larvae exist, and they seem to agree perfectly, the larger species not molesting them."

Dr. St. George Grey writes that he found the larvae of *U. Lowii* in a drain near Castries, and later he found them in a pool near the cemetery. The larva of *Uranotaenia* is shorter than that of *C. fatigans* or *S. fasciata*, while the head and thorax are much broader. The abdomen is black, and when at rest at the surface of the water lies nearly but not quite flat. Mr. Hewlett says it is rare in Trinidad, occurs in August, and bites severely.

URANOTAENIA CAERULEOCEPHALA. Theobald

(Mono. Culicid. II., p. 256, 1901.)

I have described the ♀ of this species, but not the ♂, a description of which is here given :

♂. Thorax like the female, but the metallic patches in front and the lines in front of the wings very pale blue in certain lights. The head is brown and deep violet in the middle, with pale blue scales on each side; palpi brown; proboscis brown swollen at the apex; antennae banded brown and deep brown, brown plumed. Abdomen showing a pale apical ventral spot on the fifth segment; paler ventrally than dorsally, fore unguis unequal, the larger sickle-shaped simple; mid and hind apparently equal and simple, irregularly curved.

Wings with brown veins, a line of metallic flat pale blue and violet scales at the base of the costa and another at the base of the fifth long vein; posterior cross-vein twice its own length distant from the mid cross-vein; halteres with pale stem and brown knob.

Length.—3 to 3.5 mm.

Habitat.—Gambia (Burdett ♀ and Dutton ♂).

Time of capture.—December.

Observations.—The ♂ is described from two fairly perfect specimens caught in a marsh behind the town on McCarthy's Island. I feel certain from the thoracic ornamentation it is the male of *U. caeruleocephala* (mihi) described from Bonny. The chief difference from the female lies in the deep violet in the middle of the head instead of pale blue all over.



Fig. 168.

Wing of *Uranotaenia caeruleocephala*.

♀. Theobald.

The markedly light brown thorax with the metallic and pale blue ornamentation should at once separate it. I had to mount some of the legs of the ♂ type in balsam to make any-

thing of the unguis. In doing so I misplaced them, so am not sure if the anterior or the mid unguis are unequal, probably, like *M. Mashonaensis*, it is the fore pair. A figure of the ♀ wing is given from Uganda.

Additional locality.—Entebbe, Uganda (Dr. Low).

URANOTAENIA PULCHERRIMA. Arribalzaga.

(Mono. Culicid. II., p. 244, 1901.)

Additional locality.—Antigua, two ♂'s and one ♀, bred from white larvae in January, August and December.

Note.—Regarding the larva of this species, Mr. Forrest writes as follows: "After having once seen the larva, it can hardly be mistaken, as it is so different from the *Culex* larvae, being of an opaque creamy-white colour."

URANOTAENIA DOMESTICA. Theobald.

(Mono. Culicid. II., p. 253, 1901.)

This species was placed by error in this genus. It is now included in the new genus *Aedimorphus* (p. 290).

URANOTAENIA ALBA. n. sp.*Uranotaenia Mashonaensis*. Theobald.Var. *alba*.

(Mono. Culicid. II., p. 262, 1901.)

This is a distinct species, not a variety of *Mashonaensis*, which comes in the genus *Mimomyia*. The second posterior cell is nearly twice as large as the first sub-marginal; in *M. Mashonaensis* (♂) it is very little larger. It is a true *Uranotaenia*, whilst *Mashonaensis* is not.

URANOTAENIA ANNULATA. Theobald.

(Mono. Culicid. II., p. 250, 1901.)

Additional locality.—Gambia (Dr. Annett).

Note.—Figures of the ♀ wing are here reproduced.



Fig. 169.

Uranotaenia annulata (♀), Theobald.
Showing slight variation in venation.

GENUS 37. **MIMOMYIA.** nov. gen.

Allied to *Uranctaenia*.

Head clothed with flat scales and somewhat upright forked ones, thorax with narrow-curved scales, no flat ones; scutellum with narrow-curved scales only. Fork-cells very small, but rather larger than in *Uranotaenia*, the first sub-marginal smaller than the second posterior, and the supernumerary cross-vein nearer the base of the wing than the mid cross-vein; scales short and rather broad along the veins, with lateral clavate scales to the veins here and there. No lines of flat metallic scales at the base of the wings.

The genus is closely related to *Uranotaenia*, but can at once be told by the absence of flat scutellar scales, the uneven cross-veins and the slightly larger fork-cells, and the absence of metallic flat scales on the mesothorax.

The specimens I have described as *U. Mashonaensis* evidently come in this genus, but the scutellum is too much rubbed to say definitely. The original description reads, "scutellum with narrow curved scales." It thus evidently comes in this genus, and there is also a resemblance in the fork-cells.

MIMOMYIA SPLENDENS. n. sp.

Head golden yellow, proboscis yellow, with black apex; thorax with metallic apple-green scales; abdomen deep violet brown, base and apex ochraceous and with traces of narrow pale basal lines to the segments. Legs with the femora ochraceous, apex dark, and with mauve spots in certain lights, rest of the legs brown, darkest on the tarsi. Wings brown, ochraceous at the base.

♀. Head covered with flat golden scales, with several small and two prominent black bristles projecting forwards, and with four golden yellow ones in front between the antennae; antennae brown, basal and next two joints ferruginous; proboscis deep ochraceous, with a black swollen apex; palpi prominent, with black scales.

Thorax black, with narrow-curved apple-green scales, all sloping backwards; the scales are of peculiar form, being abruptly truncated; scutellum black, with similar scales and six large and

several small black bristles; metanotum black; pleurae black, with some pale scales and a small spot of white scales in front of and below the wings.

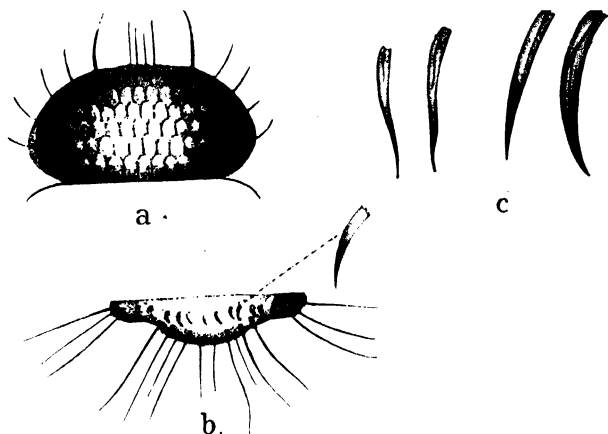


Fig. 170.

Mimomyia splendens. n. sp.

a, head; b, scutellum; c, mesothoracic scales.

Abdomen metallic violet-brown, basal segment all ochraceous, the second segment with dull ochraceous scales at the base and, laterally, the other segments with traces of pale scales basally, the penultimate segment with two basal lateral ochraceous spots and the apical segment ochraceous.

Legs with the coxae pale, base and venter of femora bright ochraceous, apex of femora dark metallic violet; tibiae, metatarsi and tarsi of the fore legs black; in the mid, the base of the metatarsi and first three tarsi with rather indistinct narrow pale bands; in the hind legs there are traces on the metatarsi and first tarsals only, really basal ventral pale spots; ungues all equal and simple.

Wings with typical *Uranotaenia* scales; the first sub-marginal with its stem about $1\frac{1}{3}$ the length of the cell; the second posterior with its stem a little longer than the cell; posterior cross-vein not as long as the mid, nearly twice its own length distant from it; the supernumerary not joining the mid; the first sub-marginal cell larger than in *Uranotaenia*; base of the wings yellowish; halteres pallid.

Length.—2.5 mm.

VOL. III.

Habitat.—Entebbe, Uganda (Dr. Low).

Observations.—Described from a single ♀ bred by Dr. Low. The larvae have a curious position when in the water, between that of *Culex* and *Anopheles*. It is a very marked and beautiful little species, the golden head and metallic apple-green thorax at once separating it from all other known *Culicids*.

MINOMYIA (?) MASHONAENSIS. Theobald.

Uranotaenia mashonaensis. Theobald.

(Non var. *alba*.)

(Mono. Culicid. II., p. 259.)

Although no fresh specimens of this species have been received, from the study of the new African species described above I am sure it belongs to this genus.

The specimen described as a variety of it, under the name var. *alba*, is separate, so has to be raised to specific rank, as *Uranotaenia alba*, Theobald, being a true *Uranotaenia*.

GENUS 38. AEDEOMYIA. Theobald.

(Mono. Culicid. II., p. 218, 1901.)

A single new species, *Aedeomyia Americana*, has been added to this genus. No specimens of *Aedeomyinae* answering to *Aedes venustipes*, Skuse, have come from Australia at present.

AEDEOMYIA AMERICANA. Neveu-Lemaire.

(Archives de Parasitologie, VI., p. 23, 1902.)

The following is the original description :—

“ Head yellowish-brown; antennae longer than the proboscis in the ♀; maxillary palpi less than a third of the length of the proboscis and composed of three joints in the ♀. Thorax brown, lighter at the sides; wings longer than the abdomen and transparent, the costal vein darker than the rest; legs dark brown, unbanded and completely covered with scales. Ungues simple in the ♀. Abdomen brown on the dorsal side; pale yellow ventrally.

"♀. Head yellowish-brown, with small upright black scales and narrow-curved yellow ones. Antennae yellow and longer than the proboscis and measure 1.96 mm. The maxillary palpi less than a third of the proboscis and measure 0.34 mm., formed of three joints, of which the last is longest, yellow in colour. Proboscis 1.57 mm., brownish, darker at the end, and covered with small scales and hairs. Thorax brown dorsally and covered with brown and golden yellow scales, the latter most numerous on each side of the median line; pleurae light yellow; scutellum pale yellow. Wings transparent; the fork-cells are unequal, the first sub-marginal cell longer than the second posterior cell; posterior cross-vein is nearer the base of the wing than the mid cross-vein; the sixth longitudinal vein nearly straight, the costal darker than the rest and the third longitudinal prolonged a little towards the interior of the first basal cell; the wing scales are both spatulate and linear; the balancers tawny.

"The legs are dark brown, unbanded, and covered with scales all the way up; the scales are less numerous on the dorsal surface of the femora. The coxae are tawny; the femora, the tibiae, and all the tarsal joints are very dark brown. The unguis are equal and simple in the two first pairs of legs; those of the last pair are missing in all specimens; their formula 0.0.—0.0.—??.

"The abdomen is brown on the dorsal surface, with the apical extremity of the rings darker and the basal part lighter. The ventral surface is pale yellow, with a little brown apical band; laterally are yellowish spots.

"Total length of body, including the proboscis, 6.5 mm."

Note.—*Aedeomyia Americana* differs at a glance from the only two species of the same genus known—*Ae. squammipenna* and *Ae. venustipes*—in that in the two last species the legs are ringed with white, while in *Ae. Americana* they are all dark.

Habitat.—Dr. Mathis has collected four specimens of this small species in the month of January in the village of Counani, Guiana.

AEDEOMYIA SQUAMMIPENNA. Arribalzaga.

(Mono. Culicid. II., p. 219, 1901.)

Additional localities.—British Guiana, at the Hospital at Georgetown; one ♂ (Dr. Low); Trinidad (Dr. Lassalle); Ceylon, at Trincombud in March and May (E. Green); Sudan, at Gondokoro, on a small lake eight miles from the latter place (Dr. Loat, per Dr. Keatinge).

GENUS 39. **HAEMAGOGUS.** Williston.

(Mono. Culicid. II., p. 238, 1901.)

A number of fresh specimens of the previously known species (*cyaneus*) have been received and a new species added to the genus.

HAEMAGOGUS CYANEUS. Fabricius.*Culex cyaneus.* Fabricius.*Haemagogus splendens.* Williston.

(Syst. Antl., 35, 9, Fabricius; Mono. Culicid. II., p. 239, 1901, Theobald.)

Additional localities.—British Guiana, on the Demerara River at Cara Cara Creek and at Pickersgill (Low); Para (Dr. Durham); Trinidad (Dr. Lassalle).

Notes and observations.—Dr. Low sends the following notes on this species: "I caught one specimen in St. Vincent at the outlet of a valley on the leeward coast (Cumberland valley). I was sitting on a log in the bright sunlight, twelve noon, when it came and settled on my leg. I kept it alive in a test tube for two days and took it up to town to try to get it to bite a man with *F. demarquaii* embryos. It unfortunately died just before I arrived, so I mounted it and sent it, in the St. Vincent collection. The natives in the village of Calliagua, a place on the sea-coast, told me that they knew it well, and that it was found in the hills behind that place. It therefore seems to be fairly well distributed in the island."

Dr. Low also sent the following interesting note: "I think now a bush mosquito spreads *Filaria perstans* and *F. demarquaii*; it does not matter how far one is from the sea as long as the bush is not disturbed. I suspect a metallic blue mosquito as having something to do with it, as I have found it everywhere, where I have got the filariae. *F. perstans*, I think, is undoubtedly spread by a bush insect. Elephantiasis is unknown, because in the forests *Culex fatigans* is not found."

HAEMAGOGUS ALBOMACULATUS. n. sp.

Head blue, metallic; thorax shiny black, with bronze, green and blue scales; abdomen metallic violet, the penultimate and antepenultimate segments with a median patch of white scales,

laterally with white basal spots, largest at the base of the abdomen, forming almost a white line, venter basally white banded. Legs unbanded, ungues equal and simple. Wings unspotted, the first sub-marginal cell with its stem longer than the cell and the base of the second posterior cell nearer the base of the wing than that of the first sub-marginal.

♀. Head black, covered with metallic blue flat scales and with black bristles; proboscis and palpi covered with deep blue and black metallic scales; antennae black, basal joint deep brown, second joint with some dull peacock blue scales.

Thorax shiny black (denuded), with flat black, blue, and dull ochraceous scales and some white ones in front of the roots of the wings, also a tuft of black scales and numerous black bristles over the roots of the wings; back of the mesonotum notched at the sides. Scutellum deep brown, with a few large central bristles and several large lateral ones, very much separated from the mesonotum; pleurae with flat silvery-white scales.

Abdomen covered with rich metallic violet scales, the penultimate and the antepenultimate segments with a silvery-white median basal patch, laterally the segments have basal white elongated triangular spots, forming almost a distinct lateral line; venter with basal white bands; the fourth segment with two large posterior border-bristles, the fifth with one very long black bristle, arising from the middle of the segment and passing over the sixth and with two border-bristles; remaining segments with a few much shorter ones (*vide* fig. 171).

Legs unbanded, bronzy brown and metallic blue and violet, with numerous black bristles; ungues equal and simple.

Wings with brown scales and tinged with brown; the first

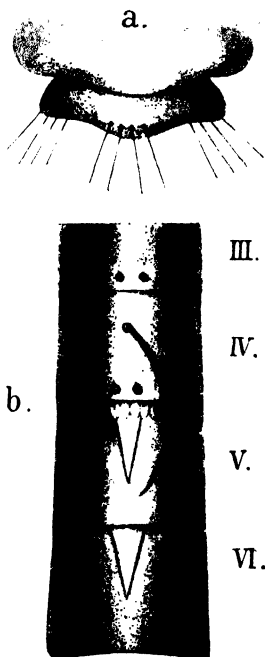


Fig. 171.

Haemagogus albomaculatus. n. sp.
a, Scutellum; b, part of abdomen
(segments III to VI).

sub-marginal cell very slightly longer, but narrower than the second posterior cell, its base nearer the apex of the wing than that of the second posterior cell, its stem a little longer than the cell; stem of the second posterior cell, which is broad, nearly as long as the cell; posterior cross-vein about twice its own length distant from the mid cross-vein; scales at the base of the wing violet. Halteres with ochraceous stem and fuscous knob.

Length.—5 mm.

Habitat.—Cara Cara, Demerara River, and Pomeroon River, British Guiana (Dr. Low).

Observations.—Described from a single ♀ taken by Dr. Low. It differs from *H. cyaneus* in the wing venation and in having two white median abdominal spots. The curious abdominal chaetotactic character is also not seen in *H. cyaneus*, as far as I have observed.

Dr. Low sends the following note on this species: "The Indians from the Cabacaburi Mission on the Pomeroon river used to bring me samples of this species amongst the mosquitoes they caught at nights. I also caught it myself at night two miles below this, at Pickersgill. When sitting at a window in the police hut there they used to come in and settle on me. Time, morning 9 to 11 A.M., during bright sunlight. It would seem, therefore, that it bites by night and day. I often got them with blood in their stomachs. I only dissected a few, and in those there was no trace of embryos of *F. demarquaii* or *F. perstans*. Fairly common."

GENUS 40. **WYEOMYIA**. Theobald (restricted).

(Mono. Culicid. II., p. 267, 1901.)

Head clothed with flat scales; thorax with spindle-shaped and flat scales; scutellum with flat scales. Chaetae on the metanotum. Palpi short; *proboscis not as long as the whole body*.

Wings with the veins with narrowish lateral vein scales.

This genus has only been recorded from the West Indies and South America. The male has not yet been found.

This genus includes two species, namely, *W. Grayii*, Theobald, and *W. pertinans*, Willeston.

WYEOMYIA GRAYII. Theobald.

(Mono. Culicid. II., p. 269, 1901.)

Dr. Low obtained several in the forests of St. Lucia, once on the top of a mountain over 1,000 feet high, clad with vegetation. They bite with great readiness and pertinacity. Dr. St. George Gray has also taken this species at Tabor, eight miles from Castries, 400 feet above sea-level, in February; Barbados, on the Crown lands, in March (Dr. Low).

GENUS 41. PHONIOMYIA. nov. gen.

(Plates XIV. and XV.)

Head scales flat; thoracic scales flat and spindle-shaped, irregularly disposed; scutellum with flat scales; metanotum with chaetae. Palpi very short in both sexes. Wing scales broad, the lateral ones *Taeniorhynchus*-like; the second long vein not carried past the marginal transverse. *Proboscis very long, longer than the whole body.*

Clearly distinct from *Wyeomyia*, on account of the broader wing scales and the greatly elongated proboscis.

This genus includes *P. longirostris*, and *P. aranoioides*, Theobald.

PHONIOMYIA LONGIROSTRIS. Theobald.

Wyeomyia longirostris. Theobald.*Wyeomyia Trinidadensis*. Theobald.(Mono. Culicid. II., 1901, p. 275 (*longirostris*), and p. 277 (*Trinidadensis*).)

Male specimens have now been sent by Dr. Lutz, from which the following description is drawn.

♂. Head with flat metallic brown scales, silvery white at the sides; antennae deep brown; basal joint large, deep brown, with long verticillate hairs; palpi very minute, black scaled; proboscis very long, longer than the whole body.

Thorax deep brown, densely coated with closely applied bronzy-brown scales, with metallic lustre, the edges of the mesonotum with paler scales; prothoracic lobes with metallic violet flat scales; scutellum with flat metallic bronzy scales; metanotum brownish black, with brown chaetae; pleurae brown, densely clothed with flat silvery-white and creamy scales.

Abdomen black, with metallic deep violet scales, the segments with basal creamy to silvery-white lateral patches; the apical segment with an apical patch of silvery-white scales; genitalia small, brown, not prominent; venter with many silvery-white scales.

Legs with the coxae ochraceous, with patches of flat white scales; fore legs deep brown, with violet reflections; mid legs with the second, most of the third and fourth tarsals white on one side, and also most of the other joints ventrally; hind legs unadorned, mostly white beneath; mid ungues simple, unequal; hind equal and simple; (fore?).

Wings with brown scales, large and *Taeniorhynchus*-like; fork-cells long, the first sub-marginal longer and narrower than the second posterior, its base nearer the base of the wing than that of the latter, its stem rather more than one-third the length of



Fig. 172.

Wing of *Phoniomyia longirostris*. ♂. Theobald.

the cell; stem of the second posterior cell about two-thirds the length of the cell; posterior cross-vein more than half its length distant from the mid; second long vein not carried past the marginal transverse.

Length.—3.5 mm.

Habitat.—Sao Paulo (Dr. Lutz); Trinidad (Dr. Lassalle).

Observations.—The male is very like the ♀, but the antennae have rather longer verticillate hairs, and the ♂ genitalia at once separates it.

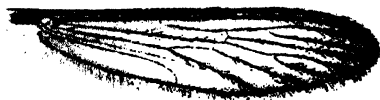


Fig. 173.

Wing of *Phoniomyia longirostris*. ♀. Theobald.

Synonymy.—I first described this insect from worn material; when fresh specimens were received from Trinidad they presented

such a marked difference, and having been received from a fresh locality, I took them for a distinct species. Dr. Lutz now sends me two ♂'s of the *longirostris*, and this enables me to see that the two species are the same. The name *Trinidadensis* must, therefore, sink as a synonym. A photograph of the wing of the ♀ is given on page 312.

GENUS 42. **DENDROMYIA.** nov. gen.

(Plate XV.)

Allied to *Wyeomyia*, but differs in that the scutellum has smaller flat scales much rounded apically, and the wings have long, broad, dense *Taeniorhynchus*-like scales, some ending asymmetrically. The head is covered with flat scales; basal joints of antennae scaly. Mesothorax with large spindle-shaped scales; prothoracic lobes with flat ones; fork-cells long. Proboscis of moderate length, swollen apically. It differs from *Phoniomyia* in the much shorter proboscis and more densely scaled wings (*vide* Plate XV.). Five species are known.

DENDROMYIA ULOCOMA. n. sp.

Head covered with flat dark brown scales. Thorax shiny ochraceous brown, with spindle-shaped bronzy-brown scales; prothoracic lobes with the same. Abdomen ochraceous-brown, covered with dusky-black scales, unbanded and unspotted; venter pale ochraceous. Legs and proboscis brown, unbanded.

♀. Head dark brown, covered with flat dark scales, a few paler ones round the eyes, two black bristles projecting between the eyes, and a few dark shorter ones over them; antennae, palpi, proboscis, and clypeus dark brown, the antennae with the basal and second joints with small dark scales.

Thorax bright shiny ochraceous brown, covered with rather large spindle-shaped dusky scales; prothoracic lobes with similar coloured flat scales; scutellum paler ochraceous, with similar scales to the mesothorax; metanotum deeper brown, with brown chaetae; pleurae bright ochraceous, with numerous flat white scales.

Abdomen covered with dusky black scales, unbanded and unspotted ; venter covered with ochraceous scales.



Fig. 174.

Dendromyia ulocoma. n. sp

a, Fore unguis of ♀ ; b, thoracic scales.

Legs brown, unbanded, paler at their bases ; unguis equal and simple, not much curved.

Wings clothed with large *Taeniorhynchus*-like scales ; fork-cells long ; first sub-marginal cell much longer, but not quite as wide as the second posterior cell, its base nearer the base of the wing than that of the latter, its stem about a fourth of the

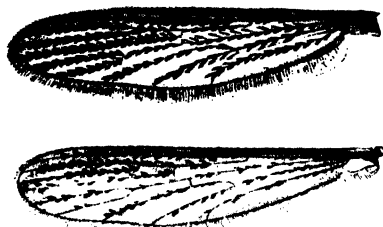


Fig. 175.

Wings of *Dendromyia ulocoma*. ♀. n. sp.

(One wing partly denuded and to show variation.)

length of the cell ; stem of the second posterior cell rather more than half the length of the cell, longer than the stem of the sub-marginal cell ; posterior cross-vein rather more than its own length distant from the mid.

Halteres ochraceous, with a slightly fuscous knob, sometimes almost entirely ochraceous.

Length.—3 to 3·5 mm.

Habitat.—British Guiana, Demerara River (Dr. Low).

Observations.—Described from four females. It comes near *D. luteoventralis*, Theobald, from Para, but is rather smaller and of a more ochraceous tint, and the head is all dark scaled, there being no median pale scaled area; moreover, the thoracic scales are smaller and the wing scales more elongated. The specimens were taken by Dr. Low in the forest near Demerara River at twelve noon in subdued light.

DENDROMYIA ASULLEPTA. n. sp.

Head with a pale scaled median line. Thorax ochraceous, with two dark areas in front, dusky before the scutellum, covered with black spindle-shaped scales and some flat yellow ones at the sides, and forming a small area in front of the wings; prothoracic lobes with flat yellow scales. Abdomen deep dusky brown above, ochraceous below. Legs brown, unbanded.

♀. Head covered with flat violet scales, except a yellow patch in the middle in front; proboscis, palpi, and antennae deep brown. Thorax ochraceous, with two dark patches on each side in front and a dusky patch behind (partly denuded), covered with spindle-shaped, almost black scales, with a few flat yellow ones at the sides, and forming more or less of a patch on each side behind the wings; *prothoracic lobes yellow scaled*; pleurae bright ochraceous with flat pale ochraceous scales; metanotum bright ochraceous, with two prominent and some smaller bristles.

Abdomen ochraceous, covered with dusky black scales; venter pale.

Legs brown (ochraceous when denuded), paler at their bases; the ungues are small, equal and simple and more curved than in the closely related *D. ulocoma*.

Wings with the veins covered with brown scales, rather short and broad and some with slightly asymmetrical convex apices, some, especially those on the stem of the second, third and stem of the fourth long veins more elongated; second long vein carried well past the marginal cross-vein; the first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem equal to one-third the length of the cell; stem of the second posterior as long as the cell; posterior cross-vein about a third of its length distant from the mid.

Halteres ochraceous, with a few fuscous scales on the knob.

Length.—3 mm.

Habitat.—British Guiana, Demerara River (Dr. Low).

Observations.—Closely related to both *D. luteoventralis*, Theobald, and *D. ulocoma*, n. sp., but can be told from the former by the position of the cross-veins and from the latter also by the position of the cross-veins, the head colouring, the form of the unguis and the scale structure of the wings. This species was taken by Dr. Low in the forest along the River Demerara about twelve noon in subdued light.

DENDROMYIA PARAENSIS. n. sp.

Thorax ochraceous brown, with spindle-shaped black and bronzy scales; prothoracic lobes bright ochraceous. Abdomen black, with basal creamy triangular lateral spots. Legs all brown.

♀. Head covered with flat brown scales, with violet reflections, a few creamy ones at the sides and a few yellow ones

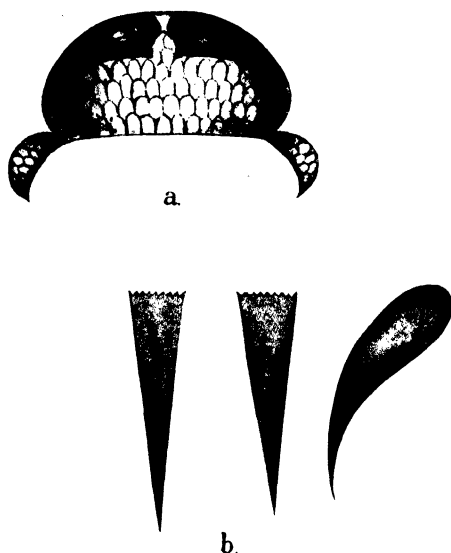


Fig. 176.

Dendromyia Paraensis. n. sp.

a, head; b, varieties of wing scales.

in front forming a prominence between the eyes at the top; the eyes separated by a white line; antennae, palpi, and proboscis brown to black; proboscis thick, about as long as the body.

Thorax ochraceous brown, covered with flat spindle-shaped black scales, some with violet reflections; scutellum ochraceous, with large flat black scales; metanotum brown, with a dense tuft of brown bristles; pleurae ochraceous, with flat scales.

Abdomen black, with basal ochraceous lateral spots, triangular in form; basal segment testaceous, with a few violet scales.

Legs brown to almost black, paler brown at the base; femora yellowish beneath, unbanded; unguis equal and simple.

Wings with rather broad elongated triangular scales on the apices of the first to fourth veins, the base of the second with a few very long scales, some ending convexly; first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem about one-third the length of the cell; stem of the second posterior equal to rather more than half the length of the cell; posterior cross-vein not quite its own length distant from the mid cross-vein.

Halteres with pale stem and fuscous knob.

Length.—3.5 mm.

Habitat.—Para, Brazil (Dr. Durham).

Observations.—Described from a single ♀. To some extent this species resembles *P. Trinidadensis*, but the absence of any white on the legs will at once separate it from that species, and more especially the shorter proboscis and more densely scaled wings. The peculiar knob-like patch of yellow scales between the upper surface of the eyes is also very characteristic.

DENDROMYIA QUASILUTEOVENTRALIS. n. sp.

Thorax dark brown, with broad dusky scales; pleurae testaceous, with white scales; scutellum deep brown, with large dark scales; metanotum deep brown. Abdomen deep brown to black above, pale golden below, unadorned. Legs deep brown to black, the hind metatarsi longer than the hind tibiae. Wings densely scaled with rather broad scales; stem of the first sub-marginal about one-half the length of the cell.

♀. Head deep brown, covered with flat brown scales, a small white border round the eyes and a white line between them; antennae and palpi and proboscis black; clypeus covered with frosty grey sheen.

Thorax black, covered with irregularly-scattered flat dusky-brown scales, largest over and in front of the wings, where there are a few brown bristles; scutellum deep brown, covered densely

with large flat dusky-black scales, and with brown border-bristles, four to the mid lobe; metanotum black, with brown bristles; pleurae bright testaceous, with flat white scales.

Abdomen black, covered with black scales above; pale golden below.

Legs black; coxae ochraceous to testaceous, with a large patch of flat white scales on each; hind metatarsi longer than the hind tibiae; unguis small, equal and simple.

Wings with broadish brown scales on the forks and on the third long vein; the first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem more than one-third the length of the cell; stem of the second posterior two-thirds the length of the cell; the second long vein carried past the marginal cross-vein; posterior cross-vein about half its length distant from the mid cross-vein.

Length.—3.5 to 4 mm.

Habitat.—British Guiana (Dr. Low).

Observations.—Differs from *luteoventralis* in the relative length of the hind metatarsi and tibiae.

The specimens were taken at the following places in British Guiana: Moranhanna, Barima River, and Demerara River.

DENDROMYIA LUTEOVENTRALIS. Theobald.

Wyeomyia luteoventralis. Theobald.

(Mono. Culicid. II., p. 348, 1901.)

Additional localities.—British Guiana (Dr. Low); Trinidad (C. W. Hewlett and Dr. Lassalle); Sao Paulo (Dr. Lutz).



Fig. 177.

Wing of *Dendromyia luteoventralis*. ♀.

Note.—The specimens taken by Dr. Low were caught in the forest near the Demerara River at 12 noon in subdued light.

GENUS 43. **RUNCHOMYIA.** nov. gen.

(Plate XV.)

Allied to *Dendromyia*.

Head covered with flat scales and upright forked ones behind; proboscis very long in the ♀, as long as the whole body, scaly; clypeus nude; basal joint of antennae bristly, flagellum verticillate; *frons drawn out into a blunt spine* in the ♀ (fig. 178, e). Thorax covered with narrow-curved scales with broader ones over the wings and in front of the scutellum; prothoracic lobes and scutellum with flat scales; metanotum with a tuft of bristles. Abdomen covered with flat scales and with a ventral apical tuft of bristles. Legs with hind tibiae dilated with simple ungues in the ♀.

Wings with the veins covered with rather broad scales; fork-cells long; cross-veins as in *Dendromyia*. The palpi are very short in the ♀.

This genus is founded on two ♀ specimens (one of which is imperfect). The character upon which the genus is founded is the peculiar projecting blunt frontal process in the ♀, long proboscis, the anal bristles, and wing scales. It is evidently closely related to *Dendromyia*, but is a very much larger insect than any I have seen in that genus.

RUNCHOMYIA FRONTOSA. n. sp.

Head covered with flat brown and violet scales. Thorax ochraceous to black, with brown narrow-curved scales; pleurae ochraceous, with white scales; scutellum with flat scales, with blue and violet reflections. Abdomen ochraceous, covered with flat black scales, with a violet reflection. Legs ochraceous, covered with blackish-brown scales, unbanded. Proboscis as long as the thorax and abdomen in the ♀.

♀. Head covered with flat brown and violet scales, the violet ones most prominent at the sides, and with black, forwardly projecting bristles; antennae brown, with blackish, verticillate hairs, basal joint bright testaceous, flattened, with small black bristles at the inner side; palpi ochraceous, with brown scales

and black bristles; clypeus brown; proboscis black. Frontal tubercle (fig. 178, e) ochraceous.

Thorax bright brown (much denuded), with apparently brown narrow-curved scales; prothoracic lobes covered with flat

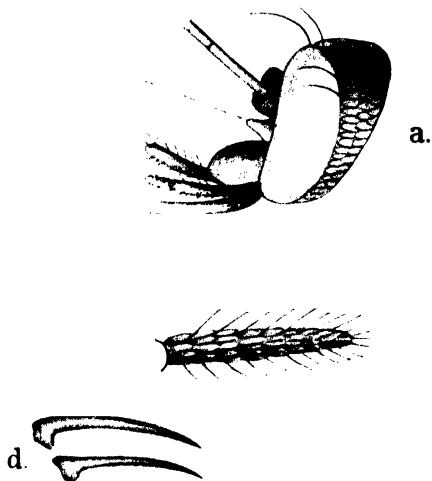


Fig. 178.

Runchomyia frontosa. ♀. n, sp.

a, Head; e, frontal process; b, basal lobe of antennae; c, palp of ♀;
d, ♀ unguis.

ochraceous scales; scutellum ochraceous, with flat brown scales with blue reflections; four border-bristles to the mid lobe; metanotum brown, with six (?) bristles on its apical half; pleurae bright ochraceous, with silvery scales.

Abdomen ochraceous when denuded, covered with black scales with deep violet reflections, border-bristles black, very short; apical segment bristly.

Legs ochraceous, covered with deep brown scales; unguis equal, simple, rather straight (d).

Wings with the veins covered with large broad brown scales and some long ones, the costa black, with spiny scales; fork-cells long, the first sub-marginal a little narrower and much longer than the second posterior cell, its base a little nearer the base of the wing, its stem more than one-third the length of the cell; stem of the second posterior more than half the length of the cell; the second long vein carried a little way past the marginal

transverse; base of the first sub-marginal nearer the apex of the wing than the junction of the sub-costal and costal; posterior



Fig. 170.

Wing of *R. frontosa*. ♀. n. sp.

cross-vein about one and a half times its own length from the mid cross-vein, both of which are longer than the supernumerary. Halteres ochraceous; a few fuscous scales on the knob.

Length.—6 mm.

Habitat.—British Guiana; at Barima River, and Pomeroon Mission (Dr. Low).

Time of capture.—August (British Guiana).

Observations.—Described from two ♀'s; they unfortunately had the mesothorax denuded; one is perfect otherwise. This species certainly deserves generic rank owing to the strange structural peculiarity of the frons in the ♀ and the other characters previously shown. The specimens were taken on the river bank in virgin forest on the Barima, about 70 miles from the coast, by Dr. Low.

GENUS 44. **SABETHES.** Robineau-Desvoidy.

(Essai s. l. tri. des Culicides (1827), Rob.-Desv.; Brit. Mus. List, i. I. (1840), Walker; Dipt. Arg., xi. p. 66 (1891), Arribalzaga; Mono. Culicid. I., p. 247, and II., p. 345, Theobald.)

(Plate XIV.)

Head clothed with flat scales and with very short upright forked scales; palpi short in both sexes; antennae pilose in the ♀, rather plumose in the ♂; thorax clothed with short flat scales; metanotum with chaetae. Wings rather long and narrow, with broad scales ending asymmetrically, fork-cells long, posterior

cross-vein normally in advance of the mid. Cross-vein in the ♂ sometimes nearly its own length nearer the apex of the wing, in a line with it in the ♀, or nearly so. One or more pairs of the

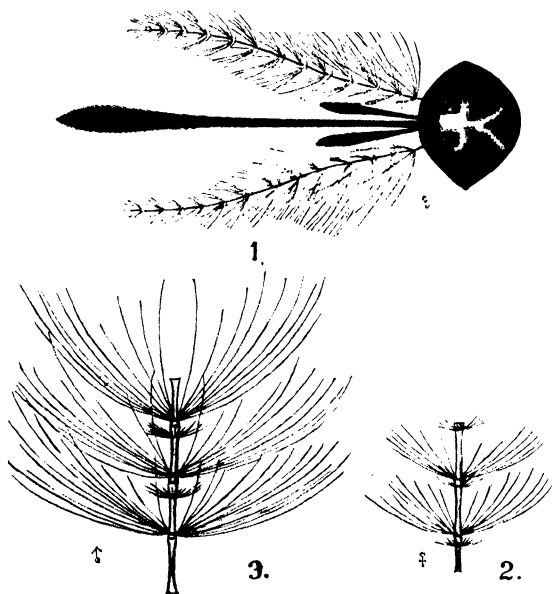


Fig. 180.

1, Head of ♀ *Sabethes*; 2, portion of ♀ antenna; 3, of ♂ antenna.

legs with dense paddle-like structures formed by long scales in both sexes. Ungues of the ♀ equal and simple, in the ♂ the



Fig. 181.

Wing of a female *Sabethes*.

fore are equal and simple, the hind small, equal and simple, and the mid of peculiar formation (*vide* fig. 184). Male genitalia prominent.

The male and female in *S. remipes* look very similar, but can at once be told by the apex of the abdomen and by the more pilose antennae in the ♂, but they are not nearly so densely plumed as in *Culex*. The specimens described as ♀ *remipes* (Vol. II., p. 346) taken by Dr. Durham at Para with the ♂ *remipes* are not so, but are a distinct species. The true ♀ *remipes* is described here (p. 324). Whether the ♂'s and ♀'s of all the other species are also both paddled as in *remipes* and *longipes* I do not know, in the meanwhile we can take, anyhow, *remipes* as the type. My reason for including certain specimens without paddle legs in this genus was that they were sent me as being ♀'s of this genus, and the peculiar position of the cross-veins, and the scale structure certainly agree with *Sabethes*. The ♀ previously described as ♀ *remipes* are referred to on page 328.



Fig. 182.
Sabethes remipes. ♀.
Apex of abdomen.

Nothing is known of the life-history of *Sabethes*, except that they are sylvan insects, and occur in huts, etc., near forest growth. I have seen three species, and Dr. Lutz mentions two others to me.

TABULATION OF SABETHES.

Mid legs only with paddles.

Paddle all black *remipes*. Wiedemann.

Paddle white at apex *nitidus*. Theobald.

All legs more or less paddled, with white

scales to the paddles as well as black *longipes*. Macquart.

With no white on the legs *Lützi*. n. sp.

Dr. Lutz also mentions to me a species he calls *S. albiprivus** —a blue and gold species with coppery paddle on the mid legs, without any white, the ♂ and ♀ resembling one another, from Sao Paulo and Rio. *S. Lützi* occurred at Manaos, on the Amazon.

* Specimens of this species have now reached me from Dr. Lutz; it is quite distinct, but clearly related to *remipes*. The cross-vein differs from any of the other *Sabethes*.

SABETHES REMIPES. Wiedemann.

(Mono. Culicid. I., p. 248, 1901, Theobald.)

♂. Head entirely clothed with flat azure-blue scales; palpi narrow, acuminate; proboscis violet, yellow beneath, except at the base and apex, with two or three bristles on the ventral

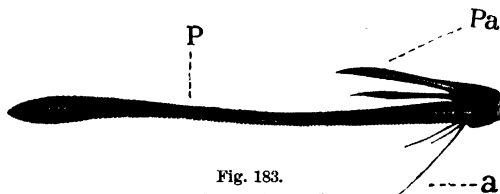


Fig. 183.

Sabethes remipes. ♂.

P, Proboscis; Pa, palpi; a, ventral chaetae.

surface at the base. Antennae with the grey segments, verticillate hairs rich brown, long, the antennae being almost plumose (fig. 180, 3).

Thorax brown, covered with flat violet-blue scales, longer and narrower in front of the scutellum, darker in the middle, in some lights forming a broad median darkened area; metanotum deep blackish-brown, with long black chaetae; pleurae brown, with flat silvery white scales.

Abdomen metallic blue above, with large lateral pale golden and silvery spots on the four basal segments, extending the whole length of the segments, and seen to some extent on the apical ones; venter pale golden and metallic, with a dense ventral tuft of black bristles.

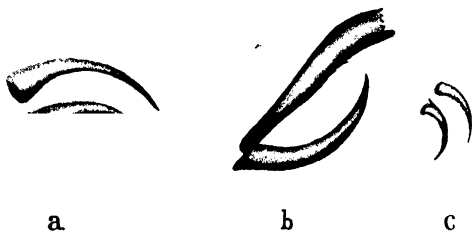


Fig. 184.

Sabethes remipes.

a, Fore, b, mid, and c, hind ♂ unguis.

Legs black, with metallic violet and purple reflections; the mid pair with a large paddle on the tibia and metatarsus of a

metallic violet and bronzy hue. Ungues of the fore legs moderately long, equal and simple, of the mid or paddle legs with one simple claw and a thick blunt claw terminating in several small blunt teeth, one longer than the rest; hind unguis small, equal and simple.

Wings long and narrow; fork-cells long, clothed with broad flat scales; first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem equal to about half the length of the cell; second posterior



Fig. 185.

Wing of *Sabethes remipes*. ♂.

cell wide, its stem nearly as long as the cell; posterior cross-vein longer than the mid, about two-thirds of its own length nearer to the apex of the wing. Halteres deep brown, testaceous at the base.

Length.—6 mm.

♀. Head clothed with flat azure-blue and green scales, with violet reflections in certain lights; palpi and proboscis almost black, with dull violet reflections; antennae brown, with pale pubescence, brown hairs and pale brown basal joints; clypeus fawn coloured, nude.

Thorax with metallic violet, coppery red and green scales, the coppery red and violet on the posterior part and especially at the sides, the arrangement of colours varies in different lights; prothoracic lobes covered with flat blue scales; scutellum with flat green scales; pleurae with shiny silvery white scales; metanotum deep brown, with black chaetae.

Abdomen metallic blue and violet, with white scales laterally; venter with blue and coppery scales; apex with brown bristles.

Legs metallic violet and coppery, the mid pair with a dense paddle as in the male; unguis of the fore legs equal and simple; mid equal and simple, nearly straight; hind very small, equal and simple.

Wings clothed with dense asymmetrical scales of a deepish brown hue, first sub-marginal cell considerably longer and narrower than the second posterior cell, its base considerably

nearer the base of the wing than that of the latter, its stem equal to half the length of the cell; stem of the second posterior as long as the cell; posterior and mid cross-veins nearly in a



Fig. 186.

Wing of *Sabethes remipes*. ♀. Wiedemann.

straight line, but very variable, often nearly its own length nearer the apex of the wing, the posterior longer than the mid.

Length.—6 mm.

Additional habitat.—Hatatura and Otyba, Brazil, Amazonas (Goeldi and Lutz); British Guiana (Dr. Low).

Notes and Observations.—The ♀ described as the ♀ of this species, p. 346, Vol. II., is not so, but a distinct species.

Dr. Low took his specimens in virgin forest during the day. It is subject to considerable variation, especially in regard to the position of the cross-veins. A large series has been received from Prof. Goeldi.

SABETHES NITIDUS. Theobald.

(Mono. Culicid. II., p. 347, 1901.)

The description of the ♂, p. 347, applies to the ♀. The ♀ described as a ♀ *nitidus* is now removed from *Sabethes*.

Fresh material has shown that the specimen (minus the apex of its abdomen) taken by Dr. Durham was a ♀ and not a ♂, the peculiarities of the male mid unguis not then being known.

Professor Goeldi sent me some fresh specimens, but they all proved to be ♀'s.

Additions to description.—The abdomen has also silvery, as well as golden scales, and evidently varies just as in *remipes*. Head with deep purple scales, as well as violet, some specimens with the purple predominating. Thorax with deep blue scales on the sides, a median broad dark area and a pale peacock blue and apple-green area laterally in front of the wings and a pale almost golden spot at the root of the wings; pleurae silvery.

Additional locality.—Para (Goeldi).

Time of capture.—May.

SABETHES LONGIPES. Fabricius.

(Mono. Culicid. I., p. 250, 1901.)

Additional characters :—

♂. The mid last tarsal joint has a dense tuft of black scales, and the ungues are unequal, the larger being thick and blunt, of peculiar form as in *remipes*.

Head with also silvery scales laterally and some peacock green ones, deep violet in some lights. Proboscis distinctly swollen at the apex.

The base of the first sub-marginal cell a little the nearer of the fork-cells to the base of the wing; posterior and mid cross-veins apparently nearly in a straight line.

♀. The ♀ resembles the ♂. Head dark, with deep blue and violet scales; palpi, proboscis and antennae deep brown; proboscis a little longer than in the ♂; basal joint of antennae silvery grey. Thorax black, with deep metallic blue scales, becoming almost green in front of the wings, those on the scutellum brilliant blue; pleuræ bright silvery.

Abdomen deep blue, venter silvery white; in some lights the dorsal and lateral areas are purple and coppery red.

Legs as in the ♂, but the ungues all equal and simple and the last mid tarsus does not seem to be densely scaled.

Wings with the fork-cells long, the first sub-marginal considerably longer than the second posterior, its base much nearer the base of the wing, its stem a little less than one-third the length of the cell; the posterior cross-vein about the same length as the mid and slightly nearer the apex of the wing. At the base of the wing, posteriorly situated, are some reddish golden bristles. Halteres tawny at the base, fuscous apically and on the stem.

Length.—7 mm.

Additional localities.—Haitaba, Lower Amazon, and Para.

Time of capture.—April (Para).

Observations.—Several ♀'s have been sent by Professor Goeldi, as well as a single ♂. The ♂ resembles very closely the ♀, but the strangely formed mid ungues easily separate the sexes. There is some slight variation in the white markings on the legs, but never on the paddles as far as I have observed.

GENUS 45. **SABETHOIDES.** nov. gen.

Allied to *Sabethes*, but differ in having (1) simple legs; (2) shorter palpi in the ♀ sex; and (3) longer proboscis, which is not so distinctly swollen at the apex.

Head covered with flat scales; palpi very short, two-jointed, last joint long, about one-tenth the length of the proboscis; proboscis as long as or a little longer than the abdomen, not swollen to any extent apically; antennae of ♀ densely pilose, not as long as the proboscis.

Thorax with small and large flat scales ending convexly, dense over the roots of the wings and scutellum; metanotum with chaetae.

Legs simple; ungues of ♀ simple and equal.

Wings with the scales similar to *Sabethes* and with similar venation to *Sabethes*, the posterior cross-vein being either in a line with or just in front of the mid cross-vein.

The genus bears a strong resemblance to *Sabethes*, the females I took to be ♀ *Sabethes*, as also did some collectors. They can at once be separated, however, by noticing (1) the much smaller palpi, and (2) the unpaddled legs.

The two ♀'s described as ♀ *remipes* and *nitidus* are both the same, and are thus united under the name I now propose, viz., *confusus*.

SABETHOIDES CONFUSUS. n. sp.

Sabethes remipes. ♀. Theobald. (non Wied.)

Sabethes nitidus. ♀. Theobald.

(Mono. Culicid. II., p. 246 (*remipes*); p. 247 (*nitidus*).)

♀. Head covered with flat violet, green, and deep blue scales, looking brown in some lights.

Proboscis, palpi and antennae brown; basal joint of latter with grey sheen; clypeus frosty grey. Palpi very small, apparently two-jointed, possibly a small third basal joint.

Thorax black, with flat green, peacock blue and azure blue scales, the green predominating, and sometimes some dusky ones over the roots of the wings (*nitidus*) prothoracic lobes large, covered with flat green and azure blue scales; scutellum with flat metallic green, pale blue and in some lights bronzy-hued

scales; metanotum deep brown to black, with four deep brown chaetae; pleurae blackish, with dense silvery-white flat scales.

Abdomen deep metallic purple or violet, with brilliant mauve, pale blue, white and yellow scales, the pale coloured ones on each side (fig. 187) forming more or less basal spots on each side of the middle line, and a more or less distinct row beneath

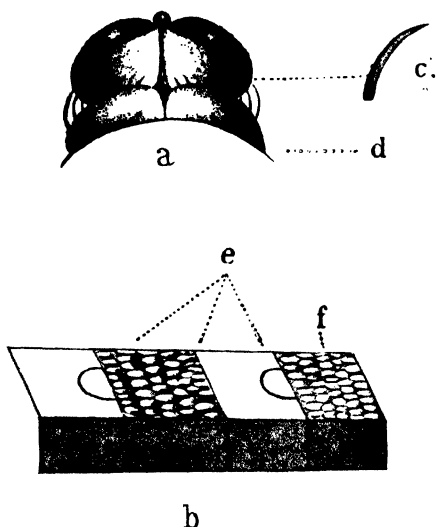


Fig. 187.

Sabethoides confusus. n. sp.

- a, Head and prothoracic lobes; b, abdomen; e, white basal patches on segments; f, first segment unadorned; d, prothoracic lobes; c, prothoracic bristle.

joining the pale scaled ventral surface. When viewed from above the abdomen seems deep metallic blue, with basal coppery bands; when viewed laterally it may be apple-green, with basal mauve bands and the pale basal spots referred to above; now and then, as the light strikes the scales, red and yellow colours appear; the apex has dense brown bristles.

Legs bronzy-brown, with violet, blue and purple reflections; in the mid legs the last three or four tarsi are irregularly white beneath; unguis equal and simple, small.

Wings clothed with *Sabethes*-like scales, brown, and the wing membrane with a brownish tinge; fork-cells long; the first sub-marginal longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem less than one-half

the length of the cell ; stem of the second posterior cell nearly as long as the cell ; the supernumerary cross-vein very small ; positions of the cross-veins variable, as a rule the mid and posterior nearly in one line and in advance of the supernumerary, or all three may be in one line. Halteres dark brown ; base paler.

Length.—4.5 to 5 mm.

Habitat.—British Guiana (Low) ; Para (Durham) ; Sao Paulo Brazil (Dr. Lutz).

Observations.—A very variable species, which presents a great variety of colours in different lights and when held in different positions. The cross-veins vary to some extent, in some the posterior is much nearer the apex of the wing than the mid, in others it is level with the mid. This species may easily be mistaken for a ♀ of *Sabethes*, but the generic characters given on page 328 will suffice to distinguish it.

Synonymy.—I have carefully examined the types of ♀ *remipes* and ♀ *nitidus* and am sure they are the same, the former had evidently been in some liquid and so the coloration of the scales had been altered, and the position of the cross-veins we now know varies in this as in other *Culices*.

GENUS 46. **GOELDIA.** nov. gen.

Head clothed with flat scales ; mesothorax with flat spindle-shaped scales and larger narrow-curved ones, lanceolate in form before the scutellum ; scutellum with flat scales ; metanotum with chaetae and squamae. Palpi in the ♂ nearly one-third the length of the proboscis, in the ♀ quite small ; proboscis short and thick, not as long as the body. Wing scales like *Runchomyia*, dense and elongated, ending asymmetrically ; the cross-vein in the ♂ as in *Culex* ; in the ♀ the mid and supernumerary not united, the posterior as in *Culex*.

This genus is founded on a ♂ specimen ; the female described here bears such a strong general resemblance that I have included it under this species.

It differs from *Sabethoides* notably in its *Culex*-like venation.

GOELDIA FLUVIATILIS. n. sp.

♂. Head covered with flat grey scales, with dull violet reflections, a pale spot in front and paler round the eyes and at the sides; near the nape are some black upright forked scales, forming a rough line much as in *J. lunata*, Theobald; palpi about one-third the length of the proboscis, completely covered with deep violet scales, so that the jointing cannot be seen; proboscis rather short, deep violet and expanded apically; antennae verticillate, deep brown, basal joint pale testaceous, with black hairs; second joint testaceous at the base, with brown scales, rather swollen; clypeus grey, nude.

Thorax deep brown, covered with narrow-curved bronzy scales, except on the base of the wings, where they become broader, and also in front of the scutellum; there are also long bristles over the roots of the wings; prothoracic lobes with pale grey, almost dull white scales; pleurae testaceous, with grey scales; scutellum densely clothed with broad flat scales with violet reflections; there appear to be two long lateral and two small median border-bristles to the mid lobe; metanotum deep black, with a tuft of black chaetae and scales.

Abdomen testaceous, covered with flat violet scales, brown in some lights, the testaceous ground colour shows through the scales; posterior border-bristles minute; venter pale yellowish-grey, the last segment bristly, the black bristles extending on to the venter. Legs brown, unbanded, with metallic reflections, the apex of the hind tibiae swollen and ciliated; on the apical half is a white patch on the lower surface spreading unevenly on to the upper surface, but not forming a complete band; knee spots pale; fore and mid claws rather long, equal and simple; hind small, equal and simple.

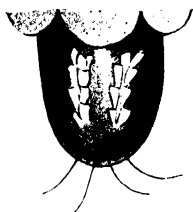
Wings densely clothed; first sub-marginal cell longer and narrower than the second posterior, its base nearer the base of the wing, its stem very short, stem of second posterior nearly as long as the cell; posterior not quite its own length distant behind the mid, the mid-cross vein and the supernumerary unite as in *Culex*; the wings have a pale spot at the base; halteres with pale stem and slightly fuscous knob.

Length.—6 mm.

♀. Head brown, with flat brown scales, a median area of flat white ones, and flat white ones at the sides; palpi brown, with a few grey scales at the apex; proboscis black; clypeus

nude, fawn coloured; antennae brown, basal joint with a few small black bristles.

Thorax brown, with flattish narrow spindle-shaped bronzy brown scales, which become larger, more elongate and lanceolate before the scutellum; scutellum testaceous, prominently trilobed, with dense flat dusky-black scales with violet reflections and black border-bristles; metanotum deep brown, with flat white scales and four chaetae in a row; prothoracic lobes with flat dusky scales and black bristles, three prominent ones on each side in front; pleurae ochraceous, with grey and white scales.



b.

Fig. 188.

Goeldia fluviatilis. ♀. Theobald.
a, Prothoracic lobes; b, metanotum.

Abdomen covered with dusky black scales with dull violet reflections; venter dull ochraceous.

Legs brown, with dull ochraceous reflections, bases dull ochraceous; ungues brown, of moderate size, equal and simple.

Wings with rather broad dense brown scales; first sub-marginal cell longer and narrower than the second posterior cell, its base a little the nearer the base of the wing, its stem about one-third of the length of the cell; stem of the second posterior nearly half the length of the cell; posterior cross-vein not its own length distant from the mid; the mid cross-vein is not quite in a line with the supernumerary.

Halteres with deep ochraceous stem and fuscous knob.

Length.—6.1 mm.

Habitat.—British Guiana (Dr. Low), Brazil (Dr. Lütz).

Observations.—Described from a single perfect ♂ sent by Dr. Lütz. The ♀ described here taken by Dr. Low in the bush on the Demerara River bears a strong resemblance to the ♂, that I have provisionally placed it here, with some doubt, however, as the legs have no white area as seen in the ♂, and the metathoracic scales are white, whilst Dr. Lütz says of the ♂ that they are white and blue (none remain on the specimen sent); these may nevertheless be only sexual differences. It bears a certain resemblance to *Joblotia lunata*, but the abdomen

has not lateral apical spots, and the ♂ differs in the palpi, and the ♀ in venation and absence of lateral spots. From *Runchomyia frontosa* it differs in the much shorter proboscis.

GENUS 47. **LIMATUS.** Theobald.

(Mono. Culicid. II., p. 349, 1901.)

The male of this genus is characterised by the peculiar structure of the proboscis (Fig. 189), which is bent above the middle, and has more or less dense scales standing out at the bend, there is also an apical tuft of scales. The palpi are minute, the legs long as in the ♀, and with all simple ungues, the mid ones are, however, of different form. The wings have rather long fork-cells and the scales on the basal parts of the veins are pedunculated, the rest as in the ♀. The genitalia is composed of two downwardly curved claspers, expanded at their apices and apparently serrated. So far Brazil is the only country from which they have been sent.

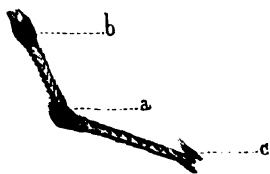


Fig. 189.
Proboscis of ♂ *Limatus Durhamii*.
Theobald.
a, b and c, Tufts of scales.
The lettering is on the ventral surface.

LIMATUS DURHAMII. Theobald.

(Mono. Culicid. II., p. 349, 1901.)

♂. Palpi apparently very small and scaly, proboscis elbowed near the middle, with a dense tuft of scales below, at the bend, and with a tuft of scales apically; near its base on the ventral surface are a few prominent downwardly projecting bristles; wing scales much as in the ♀, but those on the basal portions of the veins rather longer and more pedunculated; venation much as in the ♀; fore ungues small, equal and simple; mid larger, equal, but of different form; hind small, equal and simple. Legs long. Genitalia pale, very peculiar, but not possible to make out in detail in specimens examined.

Length.—3.5 mm.

Habitat.—Brazil.

Observations.—Described from two specimens, one taken by M. Simond, Member of the French Commission for the Study of Yellow Fever in Brazil, the other by, I presume, Dr. Lutz, who

sent me the specimens. M. Simond bred his specimens from larvae found in a tin of water discovered in the woods of the coast mountain-range near Rio. Dr. Lutz also sent a ♀. The difference between the ♂ and ♀ proboscis is very marked. The specimen I have mounted in balsam shows the genitalia, but not sufficiently well to make out in detail. I am also not quite sure of the fore unguis, as the legs in the specimen have become entangled.

SUB-FAMILY JOBLOTINA.*

GENUS 48. JOBLOTIA. Blanchard.

Trichoprosopon. Theobald.

(Compt. Rend. Hebd. Soc. d. Biolog. No. 37; Tome. liii. p. 1,043 (1901) Blanchard; Mono. Culicid. II., p. 283, 1901 (*Trichoprosopon*), Theobald.

No new species has occurred in this genus, but a species I had previously placed in the genus *Wyeomyia*—viz., *W. lunata*—belongs here. The name *Trichoprosopon*, I described this genus under, having been previously used, Prof. Blanchard renamed it *Joblotia*.

JOBLOTIA NIVIPES. Theobald.

Trichoprosopon nivipes. Theobald.

(Mono. Culicid. II., p. 285, 1901.)

Additional localities.—Rio de Janeiro and Sao Paulo (Dr. Lutz).

Notes on the Life-history.

The eggs are laid singly in small numbers on the surface of the water; the rather large larva escapes the next day. Dr. Lutz has bred out the ♀ imago in about five weeks.

Some larvae were found in a water bucket at Manaos, on the Amazon, and formed the food for *Megarhinus* larvae. Dr. Lutz says they are generally bromelia feeders, but probably lay in any water near woods.

Larva of Joblotia nivipes.

A single larva has been sent me in an immature state. It is rather transparent and the specimen somewhat shrunken;

* This sub-family and the following one should come before the sub-family *Aedeomyia*, p. 275.

the head is brown, with curious quadrangular frontal processes with seven teeth on the front border and laterally a tuft of bristles, and some on the face, and one (or two) closely applied



Fig. 190.

Head of larva of *Joblotia nivipes*. Theobald

short thick spines near the latter; the antennae are thick and close to these processes and end bluntly, but have a small lateral



Fig. 191.

Anal end of larva of *Joblotia nivipes*. Theobald.

spine and other small terminal projections, the metastoma is thick and serrated; the mandibles biserrated. Thorax with branched lateral tufts apparently in three pairs, with a pair of tufted

hairs dorsally ; the respiratory siphon is short and thick, rather rounded apically, with two tufts of bristles arising from the middle, its surface marked with little transverse lines of minute dots ; apex with small conical processes ; last segment with a dorsal and ventral tuft of long brown bristles.

JOBLOTIA LUNATA. Theobald.

Wyeomyia lunata. Theobald.

(Mono. Culicid. II., p. 279, 1901.)

This species comes in this genus, and not in *Wyeomyia*. The hairs on the clypeus are quite distinct, the row of fork scales on the head very similar.

SUB-FAMILY HEPTAPHLEBOMYINA.

A single species occurs which must undoubtedly be placed in a separate sub-family, on account of there being seven, not six, longitudinal scaled veins. This aberrant form seems to suggest that the anal fold on the wing in *Culex* is either a primitive or degenerate vein.

GENUS 49. HEPTAPHLEBOMYIA. nov. gen.

Head covered with narrow-curved, flat lateral and upright forked scales ; palpi short, clavate, the last joint being distinctly swollen. Thorax with narrow-curved scales, and also the



Fig.192.

Wing of *Heptaphlebomyia simplex*. ♀. n. sp.

scutellum ; metanotum nude. Abdomen as in *Culex*. Wings with *Culex* scales and similar venation, but below the sixth long vein is a line of small flat scales forming a distinct seventh vein. Ungues equal and simple.

This genus is peculiar in having the curious line of wing scales forming a seventh vein. A single species only has so far occurred. It is clearly related to *Culex*, but can at once be separated even with a hand lens by the above character from any other *Culicid*.

HEPTAPHLEBOMYIA SIMPLEX. n. sp.

Head brown, with pale golden and grey scales ; thorax brown, with pale golden scales showing some ornamentation, pleurae grey ; proboscis and palpi brown, unbanded. Abdomen deep brown, unbanded, with traces of basal grey lateral spots. Legs deep brown, unbanded ; femora pale beneath and at the base.

♀. Head dark brown, with narrow-curved pale golden and grey scales, small, flat, white lateral ones and brown upright forked scales ; palpi deep brown, with a few grey scales apically on one side, the apex somewhat clavate ; clypeus, proboscis, and antennae deep brown.

Thorax deep brown, with narrow-curved golden scales, with some silvery-grey ones in front, and forming two rather irregular lateral patches, and also a few scattered ones in front of the scutellum ; scutellum brown, with pale narrow-curved scales ; six border-bristles to the mid lobe ; metanotum bright ochraceous brown ; pleurae pale brown and grey, with some patches of grey scales.

Abdomen deep brown to black, with basal lateral white patches, the third and fourth segments with traces of white basal median spots ; first segment with black scales only ; posterior border-bristles short and pale.

Legs deep brown, unbanded ; femora ochraceous brown, paler beneath and at the base ; knee spot pale ; unguis equal and simple.

Wings with typical brown *Culex* scales ; first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the second posterior, its stem more than one-third the length of the cell ; stem of the second posterior cell about two-thirds the length of the cell ; posterior cross-vein nearly twice its own length from the mid cross-vein.



Fig. 193.
♀ palpus of *H. simplex*.
n. sp.

The peculiarity in the wing is that there is a vein below the sixth, *with a row of thirteen scales, forming a seventh vein.*

Halteres with pale stem and fuscous knob.

Length.—4 mm.

Habitat.—Salisbury, Mashonaland (J. K. Marshall).

Time of capture.—February.

Observations.—Described from a single perfect ♀. It can at once be told from all known *Culices* by the curious line of scales forming a seventh vein to the wings.

SUB-FAMILY CORETHRINA.

GENUS 50. CORETHRA.

(Mono. Culicid. II., p. 288, 1901.)

Two new species have been added to this genus.

CORETHRA CERATOPOGONES. n. sp.

♀. Thorax pale brown to fawn, with darker brown markings; metanotum pale chestnut-brown; pleurae pale fawn and cinereous; head brown, proboscis and palpi brown, with numerous rather long brown hairs; antennae banded brown and grey. Abdomen very pale fawn to cinereous, with narrow dark brown apical borders to the segments and dark brown at the sides, only partly, however, on the last two apical segments; abdomen hairy; apex dark brown; lamellae brown.

Legs multi-banded with brown and frosty-grey on the femora and tibiae; fore femora with six dark bands and also the fore tibiae, apex and the basal band of both pale; metatarsus and first three tarsi banded with dark brown in the middle; apical joint pale; unguis very small, simple and equal; mid femora with eight dark bands, tibiae with six, the basal are broadest, base and apex of both joints pale; metatarsi and tarsi with very broad dark median bands; unguis small, equal and simple; hind femora with eight and hind tibiae with seven dark bands, base and apex of each pale; metatarsus with two median dark bands, tarsi with a single median dark band. Unguis small, equal and simple. Wings densely clothed with long brown hair-like scales, with three dusky patches on the costa, the median one where the sub-costal joins the costa and spreading on to the wing field, the

apical one spreading on to the first long vein, the basal one rather indistinct, the median one spreads across the wing field as a faint dusky band ; the third long vein is faintly darker than the rest ; wing fringe long and dense ; first sub-marginal cell considerably longer and narrower than the second posterior cell, its base very slightly nearer the base of the wing than that of the second posterior cell ; its stem about one-third the length of the cell, not quite so long as the stem of the second posterior cell ; stem of the latter more than half the length of the cell ; second long vein carried along past the marginal cross-vein ; supernumerary cross-vein sloping towards the apex of the wing ; posterior and mid cross-veins in one line ; halteres pale.

Length.—2.5 mm.

Habitat.—Gambia (Dr. Dutton).

Time of capture.—December.

Observations.—Described from a single ♀ taken by Dr. Dutton at the side of a tub on McCarthy's Island. It is the only African *Corethra* known, and can easily be told by the wing ornamentation and leg banding. The specimen is described partly from a xylol-balsam preparation, partly from the dry insect. The mouth is provided with very distinct piercing lancets. It comes most near *Corethra Brasiliensis*, but can at once be separated by the leg banding, wing venation and spotting. The great extension of the second long vein past the marginal transverse vein is a very marked character.

CORETHRA CORNFORDII. n. sp.

Head light ochraceous ; thorax ochraceous, with two rather darker broad median lines in front and darker behind ; abdomen ochraceous ; legs and wings ochraceous.

♀. Head ochraceous, darker at the sides ; eyes black ; hairy, median hairs ochraceous, lateral hairs dark brown ; proboscis and palpi brown ; antennae banded grey and ochraceous, with ochraceous hairs.

Thorax ochraceous, with two broad darker median lines in front separated by a narrow pale line and darker behind, the dark colour being almost of a pale chestnut-brown hue ; prothoracic lobes dark brown, with brown hairs ; the mesothoracic hairs ochraceous, long, on the posterior border of the mesonotum are two characteristic black spots, one on each outer angle ; scutellum ochraceous, with long pale border-bristles ; metanotum ochraceous.

Abdomen ochraceous, with ochraceous hairs, the bases of the segments are rather darker.

Legs pale ochraceous and hairy, the tarsi being dusky; unguis small, equal and simple.

Wings densely scaled with bright ochraceous scales; fork-cells long, of nearly equal width, the first sub-marginal slightly the longer, with its base a little the nearer the apex of the wing, posterior cross-vein joining the mid cross-vein; halteres bright ochraceous.

Length.—4 to 4.5 mm.

Habitat.—Shaohyling, China (Cornford).

Time of capture.—May and June.

Observations.—Described from a series of ♀'s. It is the only *Corethra* found so far in China. The only other Asiatic species, *C. Asiatica*, Theobald, is very distinct in venation, etc. The thorax of this species shows in some lights a pale grey tint at the sides in front, and some show more prominent abdominal banding than others.

GENUS 51. MOCHLONYX.

(Mono. Culicid. II., p. 303, 1901.)

No fresh notes can be added to those previously given.

BIBLIOGRAPHY OF CULICIDAE, AND SUBJECTS RELATING THERETO.

FROM 1901 TO 1903 (FEBRUARY).

- AITKEN, E. H. Notes on a tour in the North Canara district of India in search of Mosquitoes. *Journ. Trop. Med.* V. p. 325. 1902.
- ANNETT, H. E.; DUTTON, J. E.; ELLIOTT, J. H. Report of the Malaria Expedition to Nigeria. *Liverpool School Trop. Med. Memoir* IV. Pt. II. Filariasis (1901).
- BANCROFT, THOMAS L. Preliminary Notes on the intermediary host of *Filaria immitis*. Leidy. *Jour. and Proc. Roy. Soc. N. S. Wales*. Vol. XXXV.
- BATTESTI, F. Observations sur le paludisme en Corse. Bastia; in-8° de 16 pages. 1901.
- BILLET, M. A. Sur l'apparition simultanée des Moustiques du genre *Anopheles* et des premiers cas de paludisme dans la région de Constantine. 1901.
- BLANCHARD, R. Nouvelle note sur les Moustiques. *Comp. Rend. Hebdomadaires d. s. de la Soc. de Biologie*. Tom. LIV. No. 23. 1902.
- BLANCHARD, R. Observations sur quelques Moustiques. *Comp. Rend. de la Soc. de Biologie*, p. 1,045. 1901.
- BLANCHARD, R. Les Moustiques, histoire naturelle et médicale, p. 155. 1901.
- BLANCHARD, R. Les Moustiques de Paris, leurs méfaits, mesures de préservation. *Arch. de Parasitologie*. IV. No. 4. p. 615. 1901.
- BLANCHARD, R. Transmission de la Filariose par les Moustiques. *Arch. de Parasit.* III. No. 2. p. 280. 1900.
- CHRISTOPHERS, S. R. The Anatomy and Histology of the Adult Female Mosquito. *Reports Malaria Com. Royal Soc. London*. Fourth Series. 1901.
- COQUILLET, D. W. Three new species of Culicidae. *Canadian Entomologist*. 1901. p. 258.
- CROPPER, JOHN. The Geographical Distribution of *Anopheles* and Malarial Fever in Upper Palestine. *Jour. Hygiene*. II. No. 1. 1902.
- DANIELS, C. W. Some observations on the common *Anopheles* of British Central Africa; their haunts and habits of their larvae during the dry season. 1899. *Reports Malaria Com. Royal Soc. London*. Fifth Series. 1901.
- DANIELS, C. W. Distribution and Breeding-Grounds of *Anopheles* in British Central Africa. *Reports Malaria Com. Royal Soc. London*. Fifth Series. p. 33. 1901.
- DONITZ, W. Beiträge zur Kenntniss der *Anopheles*. *Zeit. für. Hygiene u. Infektionskrankheiten*. Leipzig. 1902.
- DURHAM, H. E. Report of the Yellow Fever Expedition to Para. *Liverpool School Trop. Med. Memoir* VII. 1902.

- DYÉ, L., et NEVEU-LEMAIRE. Anomalie des palpes maxillaires chez quelques Moustiques du genre *Culex*. *Bull. de la Soc. Zool. de France*. Tom. XXVI. p. 194. 1901.
- DYÉ, LEON. Notes et Observations sur les Culicides. *Arch. de Parasitologie*. VI. No. 3. p. 359. 1902.
- FAJARDO, FRANCISCO. Molestias Tropicaes. Impaludismo. Terceira Lição —quarta Lição. Stenographada e publicada pelos tachygraphos professor Francolino Camen, Dr. Henrique Teixeira Alves e Frederico Rabello Leite. Universidade Popular Livro. 1902. Rio de Janeiro.
- FINLAY, CHARLES. Two different ways in which Yellow Fever may be transmitted by the *Culex* Mosquito (*Stegomyia taeniata*). *Jour. Amer. Med. Asso.* Nov. 23 (1901).
- FINLAY, CHARLES. Finlay's Mosquito Theory before and after its Official Investigation. *Med. Record*. Aug. 31 (1901). New York.
- FINLAY, CHARLES. Yellow Fever and its transmission. *Jour. Amer. Med. Assoc.* April 13 (1901).
- GALLI-VALERIO and M. ROCHAZ. Notes on larvae of *A. bifurcatus* and *A. maculipennis*, &c. *Centralblatt für Bakt.* p. 601. 1902.
- GILES, G. M. Notes on Indian Mosquitoes. *Jour. Trop. Med.* May 15, 1901. p. 159.
- GILES, G. M. A Plea for the collective investigation of Indian Culicidae. *Bombay Natural Hist. Soc.* p. 592. 1901.
- GOELDI, EMILE A. Os mosquitos no Pará. Belem-Pará. 1902.
- GRASSI, B. Studi d. uno Zool. sulla Malaria, seconda edizione, notevolmente accresciuta. Oct. 1901. Roma.
- GRAY, ST. GEORGE. Notes on Conveyance of Disease by Mosquitoes. *Memorandum to Hon. Colonial Surgeon*. Castries. 1902.
- GREEN, E. E. Mosquitoes and Malaria. *Circular, Roy. Bot. Gardens, Ceylon*. Ser. I. No. 25. 1901.
- GUITERAS, JOHN. Experimental Yellow Fever at the inoculation station of the Sanitary Department of Havana. *Amer. Med.* Nov. 23 (1901).
- HOWARD, L. O. Mosquitoes; How they live; How they carry disease; How they are classified; How they may be destroyed. New York. 1901.
- JAMES, S. P. The causation and prevention of Malarial Fevers, a statement of the results of recent researches, drawn up for the use of Assistant Surgeons and Hospital Assistants. Simla. 1902. (Gov. Central Printing Office.)
- JAMES, S. P. Malaria in India. *Scientific Memoirs by Officers of the Medical and Sanitary Departments of the Government of India*. No. 2. New Series. Calcutta. 1902.
- JORDAN, E. O. Notes on the occurrence and habitat of *A. punctipennis* and *A. maculipennis* in the valley of the Androscoggin. *Journ. Med. Research*. Jan. 1902.
- LAVERAN. Au sujet de Culicides recueillis à Djibouti et en Nouvelle-Calédonie. *Soc. de Biologie*. 1er juin (1901).
- LAVERAN. Au sujet de la destruction des larves de Moustiques par l'huile et le pétrole. *Comp. Rend. Hebdom. Soc. d. Biologie*. p. 48 (1900).
- LAVERAN. Paludisme et Moustiques; quelques faits recueillis dans le midi de la France et en Corse. *Comp. Rend. Hebdom. Soc. de Biologie*. 987 (1900).
- LAVERAN. Sur un Anopheles provenant de Madagascar. *Comp. Rend. de la Soc. de Biologie*. 109. 1900.

- LISTON, GLEN WM. A year's experience of the habits of *Anopheles* in Ellichpur. *Ind. Med. Gaz.* Vol. XXXVI. No. 12. 1901.
- LISTON, GLEN WM. The importance of the rôle played by Mosquitoes in tropical Pathology, with a brief description of the differences between *Anopheles* and *Culex*, and a classification of the Indian *Anopheles*. *Bombay Med. and Phys. Soc.* Vol. V. No. 8. Dec. (1901).
- LOW, C. GEORGE. Mosquito Hygiene in reference to Filarial Diseases in Barbadoes. Lectures. 1902.
- LUDLOW, MISS C. S. Two Philippine Mosquitoes. *Journ. New York Ent. Soc.* X. p. 127. 1902.
- LUDLOW, MISS C. S. Description of new *Anopheles*. *Journ. American Med. Asso.*, Chicago, Illinois. p. 426. Aug. 23, 1902.
- LUTZ, FRANK E., and CHAMBERS, W. W. Report on the North-Shore Improvement Association upon the work of Mosquito extermination during the summer of 1902. U.S.A.
- NEVEU-LEMAIRE, M. Sur les réceptacles séminaux de quelques Culicides. *Bull. Soc. Zool. de France.* Tom. XXVII. 10 juin. p. 172. (1902).
- NEVEU-LEMAIRE, M. Sur la classification des Culicides. *Comp. Rend. des Séances de la Soc. de Biol.* Nov. 29, 1902.
- NEVEU-LEMAIRE, M. Description de quelques Moustiques de la Guyane. *Archiv. de Parasitologie.* VI. No. 1, p. 5 (1902).
- NUTTALL, G. H. F., and SHIPLEY, A. E. Studies in relation to Malaria. —III. (continued). The structure and biology of *Anopheles* (*Anopheles maculipennis*). *Journ. Hygiene.* I. No. 4. 1901.
- NUTTALL, G. H. F., and SHIPLEY, A. E. Studies in relation to Malaria. —II. (continued). The structure and biology of *Anopheles* (*A. maculipennis*). The Pupa. *Jour. Hygiene.* I. No. 2. April (1901).
- POLAILLON, H. Contribution à l'histoire naturelle et médicale des Moustiques. *Thèse de Paris.* 1901.
- ROSS, RONALD. Report on Malaria at Ismailia and Suez. *Liverpool Sch. Trop. Med. Mem.* IX. 1903.
- SAMBON, LOUIS W., and LOW, G. C. Report on two experiments on the Mosquito-Malaria Theory. *Medico-Chirurgical Transactions.* Vol. 84.
- SCHWALBE, DR. CARL. Die Malaria und die Mosquitos. *Beiträge zur Malaria-Frage.* Berlin. 1900.
- SCHOO, H. J. M. La Malaria in Olanda. Estratto dagli *Atti per la Soc. della Malaria.* Vol. III. 1902.
- SCHOO, H. J. M. Malaria, haar ontstaan en hare bestrijding. 1902. (Uitgave van *Het Dagblad voor de Zaanstreek.*)
- SCHOO, H. J. M. Het voorkomen van Distomum in het lichaam van *Anopheles claviger*. *Tijdschrift voor Geneeskunde Nederl.* Deel I. No. 6. 1902.
- SERGENT, ÉTIENNE. Existence des *Anopheles* en grand nombre dans une Région d'où le Paludisme a disparu. (Extrait des *Ann. de l'Institut Pasteur.*)
- SERGENT, EDMOND et ÉTIENNE. Observations sur les *Anopheles* de la Banlieue de Paris. *Annales de l'Institut Pasteur.* Tome XVI. Déc. 1902.
- SERGENT, EDMOND et ÉTIENNE. Résumé du Rapport sur la Campagne Antipaludique organisée en 1902. (Est-Algérie.)
- SERGENT, EDMOND et ÉTIENNE. Observations sur les Moustiques des environs d'Alger. *Annales de l'Institut Pasteur.* Tome XVII. p. 60. 1903.

- SHIPLEY, A. E. (See NUTTALL, G. H. F.)
- SHIPLEY, A. E., and WILSON, EDWIN. On a possible stridulating organ in the Mosquito (*Anopheles maculipennis*). *Trans. Roy. Soc. Edinburgh*. XL. Pt. II. No. 78. p. 367 (1902).
- STEPHENS, J. W. W., and CHRISTOPHERS, S. R. (i.) Relation of Malarial Endemicity to "Species" of *Anopheles*; (ii.) Some Points in the Biology of the species of *Anopheles* found in Bengal. *Reports Malaria Com. Royal Soc. London*. Sixth Series. pp. 3-20. 1902.
- STEPHENS, J. W. W., and CHRISTOPHERS, S. R. (i.) Classification of Indian *Anopheles* into natural groups. (ii.) The Relation of species of *Anopheles* to Malarial Endemicity, and Further Report. (iii.) An Investigation into the factors which determine Malarial Endemicity. *Reports Malaria Com. Royal Soc. London*. pp. 3-45. 1902.
- TAYLOR and LOGAN. Second Progress Report of Campaign against Mosquitoes in Sierra Leone. *Liverpool School Trop. Med. Mem.* V. pt. 2. 1903.
- THEOBALD, F. V. A short description of the Culicidae of India, with descriptions of new species of *Anopheles*. *Proc. Roy. Soc.*, pp. 367 to 394. Vol. LXIX. 1902.
- THEOBALD, F. V. The classification of the *Anophelina*. *Jour. Trop. Med.* June 16 (1902).
- THEOBALD, F. V. "Mosquitoes." Article. *Encyclo. Brit.* Vol. XXXI. p. 5. 10th ed. 1902.
- THOMSON, J. C. Malaria, and its relation to the Mosquito. (Reprint.) *Hong Kong Telegraph*. Dec. 16, 17. 1902.
- THOMSON, J. C. An account of Hong Kong Mosquitoes, &c. *Hong Kong Gov. Gazette*. Nov. 9 (1901). pp. 1,961 to 1,964 and 1,967 to 1,969.
- WARD, H. B. Mosquitoes in relation to human pathology. *Wood's Reference Handbook of Medical Science*. Revised Edition. Vol. V. 1902.
- WILSON, EDWIN. (See SHIPLEY, A. E.)
- ZAMMIT, T. Mediterranean Fever from a Sanitary Point of View. (Note on Mosquitoes.) *Malta Archaeo. and Scientif. Soc.* May, 1902.

LIST OF THE COLLECTIONS OF MOSQUITOES
RECEIVED AT THE BRITISH MUSEUM SINCE
MARCH, 1901, UP TO THE PRESENT TIME,
EITHER THROUGH OFFICIAL OR PRIVATE
SOURCES.

No.	Place and Name of Collector or Sender.	Specimens, &c.	Date received.
111	Kingston, Jamaica— Dr. W. Grabham	25 <i>Culex</i> and <i>Uranotænia</i> , 2 tubes of larvae and pupae, 1 <i>Geranomyia</i> <i>intermedia</i> , Walk.; 1 <i>Chironomus</i> , sp.	9 Apr., 1901
112	Wusung, China— Dr. W. G. K. Barnes, R.N., c/o The Admiralty	1 bottle, containing <i>Ano- pheles</i> and <i>Culex</i> in spirit (about 100)	29 Apr., 1901
113	Grenada, W.I.— His Honour the Adminis- trator of Grenada. (Col- lected by Dr. N. S. Dur- rant, Colonial Surgeon)	2 perfect insects, 4 larvae (pinned), and 2 pupa- cases of <i>Megarhina</i> . Collected 12 April, 1901	11 May, 1901
114	Burpengary, Queensland— Dr. Thos. L. Bancroft	62 Culicidae	8 July, 1901
115	Dacca— Lt.-Col. R. Macrae, I.M.S., M.B., Civil Surgeon of Dacca. (Collected by As- sistant-Surgeon Jogessur Mookerjee)	173 Culicidae	1 Apr., 1901
116	Pará— Dr. Durham, School of Tropical Medicine	The collection of Mos- quitoes made by sender in Pará. (Part to be returned.) (About 90 specimens)	Aug., 1901
117	Palestine— Dr. J. Cropper, Mount Ballan, Chepstow	22 Culicidae	28 Aug., 1901
118	The Dindings, Straits Settle- ments— F. J. Halifax, Esq., District Officer	45 specimens	

Place and Name of Collector or Sender.	Specimens, &c.	Date received.
Antigua, Leeward Islands— Collected by W. R. Forrest, Esq.	16 Mosquitoes	15 Apr., 1901
Perak, Federated Malay States— Collected during first five months of 1900. (Collected and presented by Dr. M. J. Wright, 83, Blenheim Place, Aberdeen)	650 Mosquitoes	25 July, 1901
Burpengary, Queensland— Dr. Thos. L. Bancroft.	89 Culicidae	7 Sept., 1901
Island of Mombasa— Collected by Dr. J. T. C. Johnson, per Basil S. Cave, Esq. (H.B.M.'s Consul)	57 Culicidae	2 Sept., 1901
British Guiana— Dr. G. C. Low, per Dr. Manson	85 Culicidae	
Mauritius— Messrs. A. Daruty and D. D'Emmerez	20 Culicidae	15 Oct., 1901
Suva, Fiji— B. G. Corney, Esq.	9 Culicidae	15 Oct., 1901
Burpengary, Queensland— Dr. Thos. L. Bancroft	21 Culicidae	10 Oct., 1901
Manila, Philippines— Miss Ludlow	7 Culicidae	13 Nov., 1901
India— Dr. S. R. Christophers, per Royal Society	3 Anopheles	
Gambia— Collected by Dr. Burdett, per F. V. Theobald	80 Culicidae	13 Nov., 1901
Tezpur, Assam— Collected by Lt.-Col. J. W. U. Macnamara, I.M.S.	149 Culicidae	15 Oct., 1901
Cedros, Trinidad, W.I.— Dr. C. W. Hewlett	31 Culicidae	14 Nov., 1901
Penang, Straits Settlements— Dr. G. D. Freer, Colonial Surgeon, Penang	20 Culicidae	3 Dec., 1901

Place and Name of Collector or Sender.	Specimens, &c.	Date received.
Jamaica— Dr. Grabham, per F. V. Theobald, Esq.	12 Culicidae	20 Dec., 1901
Ceylon— E. E. Green, Esq., per F. V. Theobald, Esq.	20 Culicidae	20 Dec., 1901
Dacca District— Collected by Assistant-Surgeon Upendra Nath Brahmachari, of the Dacca Medical College. (Presented by Major A. Alcock, I.M.S., Superintendent, Indian Museum)	15 Culicidae	9 Jan., 1902
Port Darwin, Northern Territory of S. Australia— Government Resident, Palmerston, South Australia	97 Culicidae	4 Feb., 1902
Kingston, Jamaica— Dr. Grabham	Male and female and larvae of <i>Cyclolepteron</i>	10 Feb., 1902:
India— Capt. Glen Liston, Netley Hospital, Southampton	Types of <i>A. turkhudi</i> , 4 specimens; of <i>A. meta-boles</i> , 3 specimens; of <i>A. christophersi</i> , 2 specimens; <i>A. jamesii</i> ; 1 ♂ <i>A. pulcherrimus</i>	20 Feb., 1902:
Gambia— Dr. E. Dutton, Liverpool School of Tropical Medicine, University College, Liverpool	Types of new Culicidae described in "Journal" of Liverpool School of Tropical Medicine	1 Mar., 1902
St. Lucia— Dr. St. George Gray, Castries, St. Lucia	5 Culices	3 Mar., 1902:
India— Dr. Christophers, Malarial Commission, India	Slides of Indian Anopheles larvae and Indian Anopheles	5 Mar., 1902
Luzon, Philippines— Per Miss C. S. Ludlow	Specimens of Culicidae. Part destroyed; no use. An Anopheles mounted.	12 Mar., 1902:
Fiji— Chief Medical Officer, Fiji	Specimens of <i>S. scutellaris</i> , <i>C. fatigans</i> , and a new <i>Culex</i> (30 specimens)	12 Mar., 1902.
St. Lucia, West Indies— Dr. St. George Gray, Castries, St. Lucia, West Indies	Two slides of eggs of <i>Stegomyia fasciata</i>	12 Mar., 1902.

Place and Name of Collector or Sender.	Specimens, &c.	Date received.
Barbadoes, West Indies— Dr. Low, London School of Tropical Medicine	General collection of Culicidae (32 specimens)	
Trinidad, West Indies— Dr. C. F. Lassalle, Colonial Medical Service, Trinidad	Specimen of <i>Wyeomyia luteoventralis</i>	25 Mar., 1902
Brazil— Dr. Lutz, per F. V. Theobald	New Culicidae (12 specimens)	
India— Dr. Christophers, c/o King, Hamilton & Co., Calcutta	New Anopheles (2 specimens)	14 Apr., 1902
Lagos— Dr. Strachan, 198, Adelaide Road, Brockley, S.E.	Damaged by mould (50 specimens)	14 Apr., 1902
Transvaal— Dr. Theiler, Pretoria, per Col. David Bruce, F.R.S.	Culicidae. Mostly from Pretoria (120 specimens)	21 Apr., 1902
Jamaica— Dr. Grabham, Jamaica	4 Culicidae from Kingston	21 Apr. 1902
Japan— Dr. Tsuzuki, Senior Surgeon, Japan, per Foreign Office	4 slides of Anopheles	2 May, 1902
Brazil— Dr. Lutz, Sao Paulo, Brazil	A new Anopheline (4)	6 May, 1902
Brazil— Dr. F. Fajardo, 22, Rua Hospicio, Rio de Janeiro	Unmounted Anopheles argyrotarsis &c. (20)	10 May, 1902
Madeira and Teneriffe— Rev. A. E. Eaton	Culicidae (4 specimens)	12 May, 1902
British Guiana— Dr. Low, London School of Tropical Medicine, Albert Docks	Spirit specimens of <i>Stethomyia</i> and larvae of <i>Uranotaenia lowii</i>	12 May, 1902
England— Mr. C. O. Waterhouse	<i>Culex nemorosus</i> (8)	13 May, 1902
Transvaal— Dr. Theiler, Pretoria, per Col. Bruce, F.R.S.	Anopheles and other Culicidae (70 specimens)	
Para, Brazil— Dr. Emil Goeldi	Anopheles and other Diptera (50 specimens)	14 May, 1902
Azores— Dr. Grabham, Kingston, Jamaica	Numerous Culicidae (100 specimens)	3 June, 1902

No.	Place and Name of Collector or Sender.	Specimens, &c.	Date received.
160	Para— Prof. Goeldi, Para, Brazil	Culicidae. Some specimens and types for collection, others to be returned (25 specimens)	3 June, 1902
161	Mexico— Per Dr. Thin, 63, Harley Street, W.	An Anopheles sp. in spirit	3 June, 1902
162	Transvaal— Dr. Copland, No. 2 General Hospital, Pretoria, Transvaal	Culicidae in spirit (about 70)	3 June, 1902
163	India— Capt. James, I.M.S., c/o Wm. Watson & Co., Calcutta	Wings of Anopheles culicifacies and legs of ♂. Balsam preparation	4 June, 1902
164	Canada— Prof. Poulton, Oxford	Culicidae. Part incorporated in collection, part useless (12 specimens)	4 June, 1902
165	Egypt— Dr. Keatinge, Medical School, Cairo	Culicidae in spirit (about 30 specimens)	9 June, 1902
166	Sudan, Egypt— Dr. F. M. Sandwith, Kasr-el-Ainy Hospital, Cairo	Mosquitoes. All fragments, except a bottle of spirit specimens	9 June, 1902
167	Kingston, Jamaica— Dr. Grabham	Ova, larvae of Cyclolepteron and Culex sollicitans. Mounted and added to collection	
168	British New Guinea— Dr. A. J. Craigin, Chief Medical Officer, Port Moresby, British New Guinea	Spirit specimens (about 50)	13 Aug., 1902
169	Mr. Jeffreys, Bank Street, Ashford, Kent	Specimens of Culex cantans (15)	18 Aug., 1902
170	Jamaica— Dr. Grabham, Kingston	Deinocerites (7)	18 Aug., 1902
171	Fiji— Dr. G. Corney, Suava	Specimens in tubes (about 20)	18 Aug., 1902
172	Trinidad, West Indies— C. W. Hewlett, Cedros	Numerous species (17 specimens)	28 Aug., 1902
173	China— C. S. Cornford, Esq., Shanghai	Including new Corethra (20 specimens)	4 Sept., 1902

No.	Place and Name of Collector or Sender.	Specimens, &c.	Date received.
174	Fiji— Per Dr. G. Corney, Suava	Specimens in tubes (30 specimens)	22 Sept., 1902
175	Pará— Dr. Durham, Tenison Avenue, Cambridge	Numerous unmounted Culicidae (about 80)	30 Sept., 1902
176	North America— Prof. Aldrich, Agricultural Experimental Station, Moscow, Idaho, U.S.A.	<i>C. Spencerii</i> and <i>C. incidens</i> . Mostly broken	13 Oct., 1902
177	Ismailia— Major Ronald Ross, C.B., Liverpool School of Tropical Medicine, Liverpool	Anopheles. Mostly broken. (About 50)	20 Oct., 1902
178	Entebbe, Uganda— Dr. Low	Several Culicidae, with new species (14 specimens)	20 Oct., 1902
179	Tezpur, India— Lt.-Col. Macnamara, M.D., I.M.S., Darang, India	Culicidae. Mostly damaged, and bad specimens. (About 200 specimens)	20 Oct., 1902
180	Madeira and Azores— Dr. Grabham, Madeira	Large series of common Culicidae (about 70)	20 Oct., 1902
181	W. S. Johnson	2 Culices in paper. One useless	21 Oct., 1902
182	Pará, Brazil— Prof. Goeldi	Sabethes and other Culicidae (20 specimens)	26 Oct., 1902
183	Algeria— Dr. Billet, Constantine	Anopheles, &c. (14 specimens)	26 Oct., 1902
184	Crete— Maj. J. V. Salvage, R.A.M.C. (Presented by Col. David Bruce, F.R.S.)	Mosquitoes common on the island (about 50)	3 Nov., 1902
185	Uganda— Dr. Christy, East African Protectorate, Mombasa	Collection of Culicidae in tubes. (Types of new species only for Museum). (About 100 specimens)	4 Nov., 1902
186	Singapore— Presented by H. N. Ridley, per Mr. Austen	1 ♀ <i>Desvoidia ventralis</i> . Useless—thrown away	4 Nov., 1902
187	Kamschatka, Siberia— Presented by Surgeon Vaudin, R.N., per Mr. Austen	Culicidae in spirit (about 100)	17 Nov., 1902
188	Uganda— Dr. Low, Entebbe	Culicidae, including new species (10 specimens)	17 Nov., 1902

No.	Place and Name of Collector or Sender.	Specimens, &c.	Date received.
189	Constantine, Algeria— Dr. A. Billet	<i>Mansonia uniformis</i> , &c. Too damaged to be of use.	17 Nov., 1902
190	Uganda— Dr. Moffat, Entebbe	Culicidae. All damaged. (14 specimens)	17 Nov., 1902
191	Cape Colony— Dr. Macvicar, M.B., Lovedale	3 Culicids	17 Nov., 1902
192	Bahr-el-Ghazal, Egypt— S. Lyle Cummins, R.A.M.C., c/o War Office, Egyptian Army, Cairo	Culicidae (20 specimens in paper)	17 Nov., 1902
193	Xmas Island— Dr. Durham, Kuala Lum- por, Federated Malay States	Culicidae and large Asi- lidae (30 specimens)	17 Nov., 1902
194	Cyprus— Major Girvin, R.A.M.C., per Col. David Bruce, F.R.S.	Culicidae (about 30 un- mounted and mounted specimens)	18 Nov., 1902
195	England— F. V. Theobald	♀ <i>Theobaldia annulata</i> (2 specimens)	18 Nov., 1902
196	Mexico— Prof. Carlos Garcia, Vera Cruz	All broken	1 Nov., 1901
197	Uganda— Dr. Aubrey Hodges, Inija, Busago	Various species (about 20 specimens)	1 Dec., 1902
198	Wadelai, Uganda	Tabanidae and Culicidae 4 specimens)	1 Dec., 1902
199	Philippine Islands— Collected by Miss C. S. Ludlow, U.S.A. Army, per F. V. Theobald	Specimen of <i>Stegomyia</i> <i>nivea</i> , Ludlow. Incor- porated in collection	21 Nov., 1902
200	Rio de Janeiro— Dr. F. Fajardo, 22, Rua Hospicio, Rio de Janeiro	Culicidae. All damaged and useless	2 Dec., 1902
201	Belem, Rio de Janeiro— Dr. F. Fajardo, 22, Rua Hospicio, Rio de Janeiro	Culicidae. Incorporated in collection (27 speci- mens)	15 Dec., 1902
202	Cyprus— Miss D. M. A. Bate	<i>Anopheles superpictus</i> , <i>Culex spathipalpis</i> , <i>Cu-</i> <i>lex mimeticus</i> , and larvae	1 Jan., 1903
203	Hong Kong— Dr. Thomson, Hong Kong	Culicidae, mounted. (Not yet dealt with.—F. V. T.) (About 100 specimens)	1 Jan., 1903

No.	Place and Name of Collector or Sender.	Specimens, &c.	Date received.
204	Canary Isles— Dr. Grabham, Teneriffe	Culicidae. (Not yet dealt with.—F. V. T.) (About 30 specimens)	3 Jan., 1903
205	India— Capt. James, I.M.S., c/o Messrs. Wm. Watson & Co., Calcutta	New Indian Anopheles (7 specimens)	5 Jan., 1903
206	Uganda— Dr. Low, London School of Tropical Medicine, Albert Dock, E.	Culicidae. (Not yet dealt with.—F. V. T.) (14 specimens)	13 Jan., 1903
207	Cyprus— Miss D. M. A. Bate, per Mr. Austen	Culicidae. (Not yet dealt with.—F. V. T.)	22 Jan., 1903
208	Brazil— Dr. Fajardo	New Aedeomyiinae. (Not yet dealt with.—F. V. T.) (20 specimens)	
209	Uganda— Per Foreign Office	Culicidae (about 400 specimens)	27 Jan., 1903
210	Rio de Janeiro— Dr. F. Fajardo, Rio de Janeiro	Culicidae (about 20 specimens)	3 Feb., 1903
211	Philippine Islands— Miss Ludlow	Culicidae, all unmounted (about 20 specimens)	18 Feb., 1903
212	Algeria— Dr. Sergent	New Culex (10 specimens)	23 Feb., 1903

Between 4000 and 4500 specimens in all have been received from
April, 1901, to Feb. 1903.

APPENDIX.

GENUS 10. ALDRICHIA. nov. gen.*

Head with large and broad upright forked scales; antennæ with scales on the basal joints. Thorax with very narrow curved scales, almost hair-like; on the prothoracic lobes are outstanding flat scales. Abdomen completely covered with broad flat scales as in *Culex*. Wings spotted much as in *Myzomyia*.

A single ♀ only known, which was placed amongst Giles's types of *Myzomyia Rossi*, which it resembles at a casual glance, but which is totally distinct.

It is one of the most marked genera of the *Anophelina*, the squamose armature of the abdomen exactly resembling *Culex*.

ALDRICHIA ERROR. n. sp.

Head brown, with broad yellowish upright forked scales. Palpi brown, apex white, with two other small white bands, densely scaled basally. Proboscis deep brown; antennæ brown, with pale bands, the basal segments with small flat white scales.

Thorax yellowish-brown, with very narrow curved, almost hair-like, pale yellow scales. Abdomen completely covered with flat black scales, with dull violet reflections.

Wings yellow scaled, the costa with three prominent black patches and two very small basal ones, the third spot very large and pronounced, with three spots beneath it, the second having an even black marking below it on the first long vein, so also has the apical one; the apical fringe is mostly black, and the fringe all very dark except pale areas where the veins join the borders, but scarcely noticeable at the apex of the wings; two dark spots on each branch of the first fork-cell and one at the apex and two small ones near the base of the third vein; two on

* Add after genus *Cellia*, p. 113.

each branch of the second fork-cell and two long dark areas on the stem; three on the upper and one on the lower branch of the fifth vein and two on the sixth.

Fore and mid legs brown, unbanded; hind with apical narrow pale bands.

Length.—5 mm.

Habitat.—India.

Observations.—Described from a single perfect ♀. This specimen was placed by Colonel Giles as one of the *six* types of *Anopheles Rossii*. It certainly bears a superficial resemblance, but with the naked eye one can see it is of peculiar structure. No definite locality is given, but the specimen came from India; probably it was from Calcutta.

CULEX EXCRUCIANS. Walker.

(Ins. Saund., p. 429.)

This is a good species near *C. cantans*, Mg., but is larger and the fork-cells very different, being longer, as also are the ♀ palpi, than in *cantans*. The type is in very bad condition, but the large wings are well preserved and show it to be distinct.

The following new species have been described since the final proofs went to press :—

Myzorhynchus Coustani, Laveran. Archiv. de Parasitologie, vi., p. 359. 1902. Madagascar.

Myzorhynchus pseudobarbirostris, Ludlow. Journ. N. Y. Ent. Soc., x., p. 127. 1902. Philippines.

Anopheles Philippinensis, Ludlow. Journ. N. Y. Ent. Soc., x., 1902. Philippines.

Anopheles Vincenti, Laveran. Soc. de. Biologie. 23 Nov., 1901. Tonkin.

Anopheles Farauti, Laveran. Soc. de. Biologie. July, 1902.

Anopheles pursati, Laveran. Soc. de. Biologie. July, 1902.

I have not seen these last three Anopheletes, and do not know where to place them.

Culex Mariae, Sergent. Ann. L'Institut Pasteur, p. 62. Tome xvii. 1903. Algeria.

INDEX.

A.

Acartomyia, **251**
Acartomyia Zammitii, 252
Aedimorphus, 286, **290**
Aedimorphus domesticus, 291
Aedeomyia, 5, **306**
Aedeomyia Americana, 306
Aedeomyia squammipenna, 307
Aedeomyia, 275
Aedes, **285**
Aedes Butleri, 295
Aedes fuscus, larvae of, in Pitcher plant, 286
Aedes niger, 295
Aedes Smithii, 295
Anopheles, 1, 11, **17**; cross-veins of, 9; variation of wing markings and cross-veins, 5; Brown, 3; larvae and ova of, 14
Anopheles Aitkenii, 22
Anopheles Algeriensis, 21
Anopheles annularis, 90
Anopheles annulipes, 104
Anopheles argyrotarsis, 110
Anopheles Bancroftii, 88
Anopheles barbirostris, 86
Anopheles bifurcatus, 2, 19
Anopheles Chaudoyei, 46
Anopheles Christophersi, 27
Anopheles cinereus, 38, 81
Anopheles costalis, 74
Anopheles culicifacies, **39**, 48
Anopheles fluviatilis, 27
Anopheles fuliginosus, 93
Anopheles funestus, 34
Anopheles Gambiae, 74
Anopheles gracilis, 74
Anopheles Hispaniola, **49**
Anopheles immaculatus, 23
Anopheles impunctus, 54
Anopheles Indica, 39
Anopheles Jamesii, 93
Anopheles Kochii, 110
Anopheles leucopus, 93
Anopheles Listoni, 27, **39**, 41

Anopheles Lutzii, 51
Anopheles maculata, 96
Anopheles maculipalpis, 96
Anopheles maculipennis, 1, 4, **17**
Anopheles Masteri, 105
Anopheles Mauritanus, 85
Anopheles merus, 79
Anopheles metaboles, 93
Anopheles paludis, 86
Anopheles Pharoensis, 109
Anopheles pulcherrimus, 107
Anopheles punctipennis, 419
Anopheles Rhodensiensis, 35
Anopheles Rossii, 44, **45**
Anopheles sinensis, 89
Anopheles squamosus, 109
Anopheles tenebrosus, 85
Anopheles Theobaldi, 95
Anopheles Turkhudi, 35, 41, **48**, 50
Anopheles vagus, 45
Anopheles Walkeri, 19
Anophelina, relative frequency of, and Culicina, 1; classification of, 9; variation of wing markings and cross-veins, 5; larvae and ova of, 14
Aldrichia, 10, **353**
Armigeres obturbans, 138
Armigeres panalectros, 139
Arribalzagia, 14, **81**
Arribalzagia maculipes, 81

B.

Bibliography, 341
Brachiomysia, **275**

C.

Cellia, 14, **107**
Cellia albipes, 110
Cellia argyrotarsis, 110
Cellia Kochii, 110
Cellia Pharoensis, 109

- Cellia pulcherrima*, 107
Cellia squamosa, 109
Corethra, **338**
Corethra ceratopogones, 338
Corethra Cornfordii, 339
Culex albirostris, 162
Culex albitarsis, 186
Culex alboannulatus, 175
Culex albolineatus, 192
Culex alis, 167
Culex anarmostus, 170
Culex annulirostris, 162
Culex annulus, 162
Culex annulioris, 163
Culex apicalis, 171
Culex atratus, 239
Culex Azoriensis, 210
Culex bilineatus, 196
Culex cantans, **179**, 235
Culex cingulatus, 185
Culex concolor, 230; further note on larva, 231
Culex confirmatus, 191
Culex crinifer, 209
Culex corniger, 173
Culex Creticus, 189
Culex Cumminsii, 214
Culex Curriei, 249
Culex cyaneus, 308
Culex cylindricus, 202
Culex dorsalis, 251
Culex fatigans, 225; pairing of, 3
Culex flavicosta, 257
Culex flavipes, 224
Culex fulvus, 257
Culex gelidus, 180
Culex gelidus, var. *sinensis*, 180
Culex geniculatus, 216
Culex gnophodes, 163
Culex Halifaxii, 231
Culex hirsutipalpis, 161
Culex imitator, 175
Culex impellens, 161
Culex invidiosus, 216
Culex janitor, 183
Culex Jamaicensis, 244
Culex Japonicus, 158
Culex Kochi, 284
Culex lateralis, 191
Culex maculicrura, 227
Culex marinus, 178
Culex Mathisi, 220
Culex microannulatus, 161
Culex mimeticus, 157
Culex nigripalpus, 221
Culex nigripes, 193
Culex nigrifolius, 201
Culex nocturnus, 159
Culex nubilis, 208
Culex occidentalis, 179
Culex ocellatus, 222
Culex palus, 194
Culex perexiguus, 199
Culex pipiens, 1, **224**; larva of, 251
Culex pervigilans, 206
Culex pleuristriatus, 177
Culex procax, 179
Culex pulcrpalpis, 244
Culex pulcritarsis, 244
Culex quasigelidus, 181
Culex Richardii, 269
Culex rima, 240
Culex sagax, 205
Culex Salisburiensis, 221
Culex scholasticus, 224
Culex secutor, 183
Culex Sergentii, 218
Culex serratus, 191
Culex similis, 207
Culex sitiens, 161
Culex sollicitans, 247
Culex Spencerii, 250
Culex sylvae, 194
Culex taeniorhynchus, 158
Culex Terriei, 193
Culex thalassius, 168
Culex Theileri, 187
Culex tigripes, 227; larva and pupa of, 228
Culex Transvaalensis, 165
Culex univittatus, 191
Culex varioannulatus, 198
Culex viridis, 212
Culex Vishnui, 161
Culex vittiger, 174
Culex, **157**
 Culicidae, eggs of, 6; classification of, by palpal jointing, 6
Cycloleppipteron, 10, 12, **55**
Cycloleppipteron Grabhamii, 56; life-history and habits of, 57
Cycloleppipteron mediopunctatus, **60**, 83

D.

- Deinocerites*, **275**
Deinocerites cancer, 276; life-history and habits, 279; larva and pupa, 281
Dendromyia, **313**
Dendromyia asullepta, 315
Dendromyia luteoventralis, 318
Dendromyia Paraensis, 316
Dendromyia quasiluteoventralis, 317
Dendromyia ulocoma, 313
Desvoidea, larvae and pupae of, 134
Desvoidea fusca, 135
Desvoidea obturbans, 138
Desvoidea panalectros, 139
Desvoidea ventralis, 7

E.

- Eggs of Culicidae, 6
 Eggs of Skusea, 291
 Eggs of Stegomyia, 6

F.

- Ficalbia, 296
 Ficalbia minima, 297
 Ficalbia simplex, 297
 Finlaya, 281
 Finlaya Kochi, 284
 Finlaya poicilia, 283

G.

- General notes, 1-9
 Gilesia, 233
 Gilesia aculeata, 233
 Goeldia, 330
 Goeldia fluviatilis, 331
 Grabhamia, 243
 Grabhamia ambiguus, 248
 Grabhamia Curriei, 249
 Grabhamia dorsalis, 251
 Grabhamia Durbanensis, 246
 Grabhamia Jamaicensis, 244
 Grabhamia pulcrispalpis, 244
 Grabhamia pulcritarsis, 244
 Grabhamia pygmaea, 245
 Grabhamia sollicitans, 247
 Grabhamia Spencerii, 250
 Grassia, 12, 24

H.

- Haemagogus, 308
 Haemagogus albomaculatus, 308
 Haemagogus cyaneus, 308
 Haemagogus splendens, 308
 Heptaphlebomyia, 336
 Heptaphlebomyia simplex, 337
 Howardia, 13, 66
 Howardina, 286, 287
 Howardina Greenii, 289
 Howardina Walkeri, 287

J.

- Janthinosoma, 124
 Janthinosoma Arribalzagae, 128
 Janthinosoma disrucians, 126
 Janthinosoma Lutzii, 128
 Janthinosoma musica, 126; life-history of, 124
 Janthinosoma posticata, 125

Joblotia, 334

- Joblotia lunata, 336
 Joblotia nivipes, 7, 334

L.

- Lasioconops, 235
 Lasioconops poecilipes, 236
 Laverania, 14, 92
 Limatus, 333
 Limatus Durhamii, 333
 Lutzia, 155
 Lutzia Bigotii, 155

M.

- Mansonia, 269; pupa of, 270
 Mansonia annulifera, 274
 Mansonia annulipes, 275
 Mansonia major, 270
 Mansonia titillans, 273
 Mansonia uniformis, 273
 Megarhinus, 113
 Megarhinus Gilesii, 123
 Megarhinus grandiosus, 113
 Megarhinus haemorrhoidalis, 114
 Megarhinus immisericors, 123
 Megarhinus Portoricensis, 119
 Megarhinus purpureus, 117
 Megarhinus rutilus, 124
 Megarhinus separatus, 114
 Megarhinus speciosus, 124
 Megarhinus subulifer, 123
 Megarhinus trichopygus, 114
 Megarhinus violaceus, 117
 Melanoconion, 238
 Melanoconion atratus, 239; larvae and pupae of, 238
 Melanoconion indecorabilis, 241
 Melanoconion luteopleurus, 239
 Melanoconion rimus, 240
 Melanoconion spissipes, 242
 Mimomyia, 304
 Mimomyia Mashonaensis, 305
 Mimomyia splendens, 304
 Mochlonyx, 340
 Mosquitoes, pairing of, 3; and malaria of the Wabash Valley, 3; in spider snares, 4; feeding on a corpse, 4; variation in wing markings and position of cross-veins, 4; palpal ornamentation of, 5; foreign terms for, 6
 Mucidus, 132; larva and pupa of, 132
 Mucidus Africanus, 134
 Mucidus alternans, 134
 Myzomyia, 12, 24
 Myzomyia aconita, 30

Myzomyia albirostris, 24
Myzomyia culicifacies, 5, 29, **39**
Myzomyia elegans, 51
Myzomyia funesta, 5, **34**
Myzomyia hebes, 32
Myzomyia Hispaniola, 29, **49**
Myzomyia impunctus, 54
Myzomyia leptomerus, 38
Myzomyia Listoni, 27
Myzomyia longipalpis, 37
Myzomyia Ludlowii, 43
Myzomyia Lutzii, 51
Myzomyia punctulatus, 55
Myzomyia Rhodesiensis, 35
Myzomyia Rossii, 5, 45
Myzomyia tessellatum, 55
Myzomyia Turkhudi, 29, **48**
Myzorhynchus, 5, 13, **84**
Myzorhynchus albotaeniatus, 88
Myzorhynchus Bancroftii, 88
Myzorhynchus barbirostris, 86
Myzorhynchus Mauritanus, 3, **85**
Myzorhynchus minutus, 91
Myzorhynchus paludis, 86
Myzorhynchus sinensis, 89
Myzorhynchus umbrosus, 87
Myzorhynchus vanus, 90

N.

Nyssorhynchus, 14, **92**
Nyssorhynchus annulipes, 104
Nyssorhynchus deceptor, 105
Nyssorhynchus fuliginosus, 93
Nyssorhynchus Karwari, 102
Nyssorhynchus maculatus, 96
Nyssorhynchus maculipalpis, 3, **96**
Nyssorhynchus maculipalpis, var. *indiensis*, 99
Nyssorhynchus Masteri, 105
Nyssorhynchus Pretoriensis, 3, 99 ; larva of, 100
Nyssorhynchus Stephensi, 93
Nyssorhynchus Theobaldi, 95
Nyssorhynchus Willmori, 100

P.

Panoplites, **269**
Panoplites Africanus, 273
Panoplites annulifera, 274
Panoplites annulipes, 275
Panoplites titillans, 273
Panoplites uniformis, 273
Phoniomyia, **311**
Phoniomyia longirostris, 311
Psorophora, **130**
Psorophora ciliata, 130 •
Psorophora Howardii, 131

Psorophora scintillans, 130
Pyretophorus, 13, **66**
Pyretophorus Chaudoyei, 68
Pyretophorus cinereus, 3, 78
Pyretophorus costalis, 74 ; var. *melas*, 76
Pyretophorus Jeyporensis, 66
Pyretophorus Marshallii, 77
Pyretophorus merus, 79
Pyretophorus Palestinensis, 71

R.

Russia, 13, **84**
Runchomyia, **319**
Runchomyia frontosa, 319

S.

Sabethes, 5, **321** ; tabulation of species, 323
Sabethes albiprivus, 323
Sabethes longipes, 327
Sabethes Lutzii, 323
Sabethes nitidus, **323**, 328
Sabethes remipes, 323, **324**, 328
Sabethoides, **328**
Sabethoides confusus, 328
Skusea, 286, **291**
Skusea funerea, 292
Skusea multiplex, 293
 Spider snares, Mosquitoes in, 4
Stegomyia, **139**
Stegomyia albocephala, 140
Stegomyia brevipalpis, 146
Stegomyia fasciata, pairing of, 3 ; feeding on corpse, 4 ; length of time eggs can withstand dessication, 6 ; new localities and notes, 141 ; breeding of, in England, 143
Stegomyia Marshallii, 7
Stegomyia microptera, 147
Stegomyia nigricephala, 147
Stegomyia nivea, 139
Stegomyia notoscripta, 145
Stegomyia periskelata, 145
Stegomyia scutellaris, 144
Stegomyia sugens, 7
Stethomyia, 13, **62**
Stethomyia nimba, 51, **62**

T.

Taeniorhynchus, **257**
Taeniorhynchus Arribalzagae, 261
Taeniorhynchus aurites, 269
Taeniorhynchus brevicellulus, 268
Taeniorhynchus confinnis, 259

Taeniorhynchus conopas, 268
Taeniorhynchus fasciolatus, 269
Taeniorhynchus fulvus, 257
Taeniorhynchus fuscopennatus, 265
Taeniorhynchus ochraceus, 263
Taeniorhynchus Richardii, 269
Taeniorhynchus tenax, 258
Theobaldia, 5, 148; palpal characters of, 7
Theobaldia annulata, 148
Theobaldia incidens, 5, 151
Theobaldia spathipalpis, 154
Toxorhynchites, 118, 119; larva and pupa of, 119
Toxorhynchites immisericors, 123
Toxorhynchites Marshallii, 121
Toxorhynchites rutilus, 124
Toxorhynchites speciosus, 124
Trichoprosopon, 334
Trichoprosopon nivipes, 334

U.

Uranotaenia, 298
Uranotaenia alba, 303
Uranotaenia annulata, 303

Uranotaenia apicalis, 298
Uranotaenia caeruleocephala, 302
Uranotaenia domestica, 291, 303
Uranotaenia Lowii, 301
Uranotaenia Mashonaensis, 303
Uranotaenia minima, 297
Uranotaenia pallidoventer, 300
Uranotaenia pulcherrima, 303

V.

Verallina, 286, 295
Verallina Butleri, 295
Verallina nigra, 295
Verallina (?) *Smithii*, 295

W.

Wyeomyia, 310
Wyeomyia Grayii, 311
Wyeomyia longirostris, 311
Wyeomyia lunata, 336
Wyeomyia Trinidadensis, 311

LONDON :

PRINTED BY WILLIAM CLOWES AND SONS, LIMITED,
DUKE STREET, STAMFORD STREET, S.E., AND GREAT WINDMILL STREET, W.

Plate I.



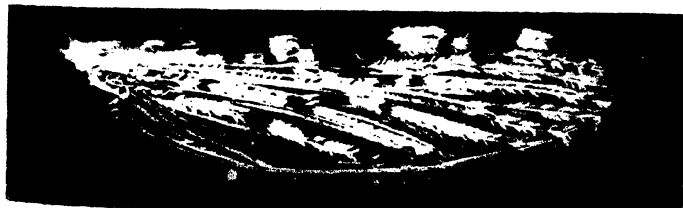
Pyretophorus cinereus ♂. Theob.



Pyretophorus cinereus ♀. Theob.



Myzorhynchus albotaeniatus. ♀. n. sp.



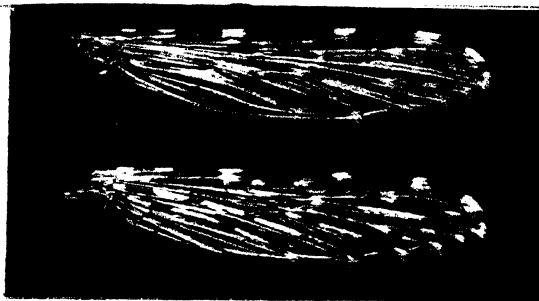
Cella pharoensis ♀. Theob.

Wings of Anophelina.

Plate II.



For Pyretophorus maculipalpis read Nyssorhynchus maculipalpis.
Giles (♂ and ♀).



P. maculipalpis. Giles (♀).



Myzomyia funesta. Giles ♀. Sierra Leone.



Myzomyia funesta. Giles ♀. Var. *subumbrosa*.



Myzomyia funesta. Giles ♀. Var. *umbrosa*. Gambia.

Plate III.



M. barbrostris. ♀ Van der Wulp.



M. nigerrimus. Giles.



M. culicifacies. Giles.



M. turkhudi. Liston.



M. rossii. Giles. (var.)



A. lindsayi. Giles.

Wings of Anophelina.

Plate IV.



N. Theobaldi. Giles.



N. Jamesii. Theobald.



N. fuliginosus. Giles.



N. maculipalpis. Giles. (India.)

Wings of Anophelina.

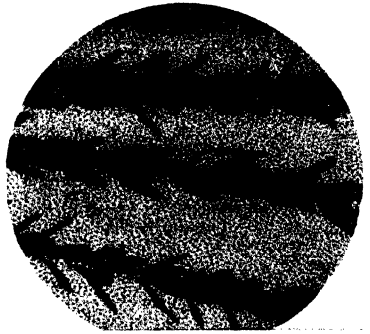
Plate V.



Myzorhynchus albotæniatus. ♀. n. sp.



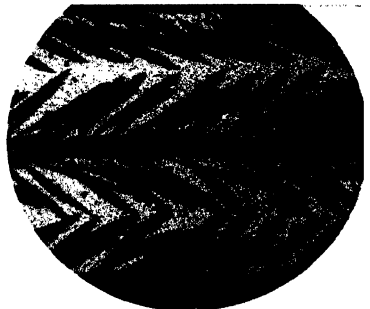
Arribalzagia maculipes. ♀. n. sp.



For Pyretophorus Pretorius read Nyssorhynchus Pretoriensis



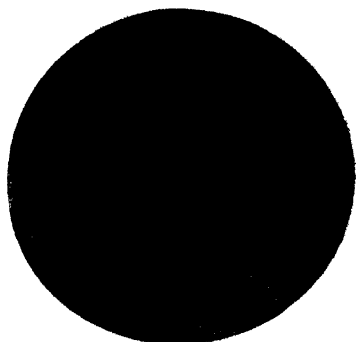
Pyretophorus costalis. (♀). Loew



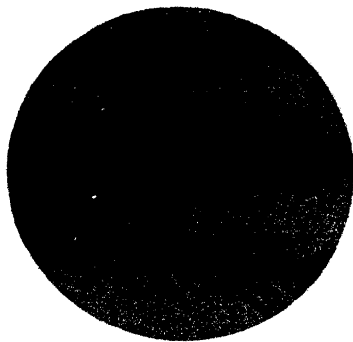
Anopheles maculipennis. (♀). Melgen.

Wing Scales of Genera of Anophelina.

Plate VI.



Pyret. palestiniensis. ♀. n. sp.



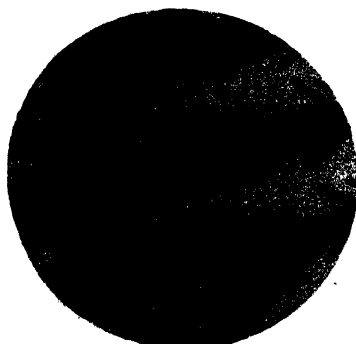
Pyret. Chandoyel. ♀. n. sp.



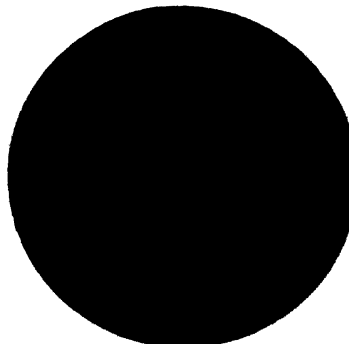
A. maculipennis. ♀. Crete.



A. bifurcatus. ♀. Crete.



Myzomyia Rossii. ♀. Giles. S. India.



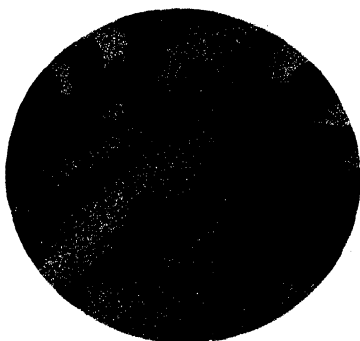
Myzomyia culicifacies. ♂. Giles.

Wing Scales of Anophelina.

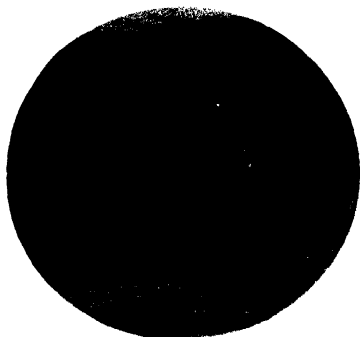
Plate VII.



Cycloleppterom mediopunctatus. n. sp.
To show darkened wing area.



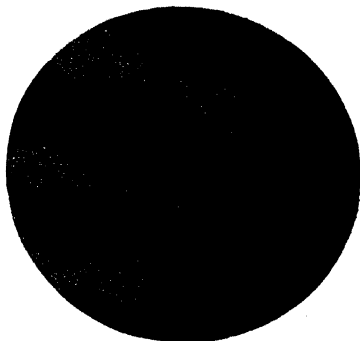
C. mediopunctatus. ♀



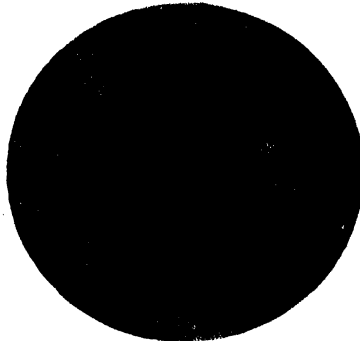
Anopheles algeriensis. n. sp.
Region of cross-veins.



Anopheles biruncatus. Linn.
Region of cross-veins.



Cella albipes. (♀). Theob.



Stethomyia nimba. n. sp. (♀)

Wing Scales of Anophelina.

Plate VIII.



Pyretophorus jeyporensis. n. sp. ♀



Myzomyia culicifacies. ♀. Giles.



Pyretophorus cinereus. ♀. Theob.



Cyclolepteron Grabhami. ♂. Theob.



Cellia pharoensis. ♀. Theob.

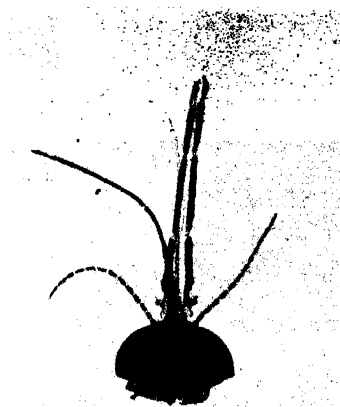


Cellia pulcherrima. ♀. Theob.

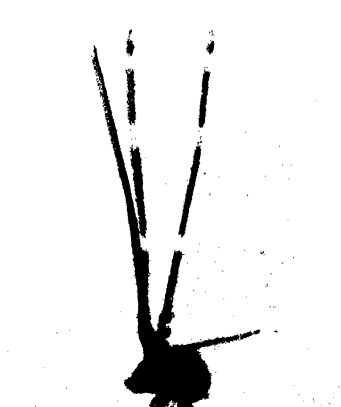
Wing Scales of Anophelina.



Myzomyia hispaniola. ♀. n. sp.



Pyretophorus chandoyi. ♀. n. sp.



Pyretophorus cinereus. ♀. Theob.



Culex annulirois. ♂. Theob.



Pyretophorus maculipalpus. ♂. Gilles.

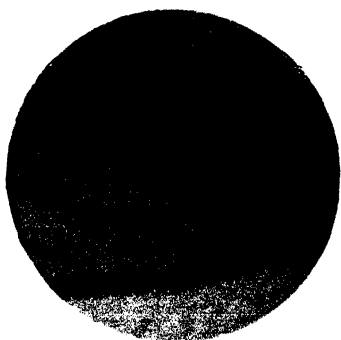


Culex cylindrus. ♂. n. sp.

Plate X.



Theobaldia spathipalpis. ♀. Rondani.



Theobaldia spathipalpis. ♀. Rondani.



Theobaldia incidens. ♀. Thomson.
(Dense scaled area.)



Theobaldia incidens. ♀.
(Spot on wing.)



Theobaldia annulata. ♀. Meigen.
(Dense scaled area.)



Theobaldia annulata. ♀. Meigen.
(Dense scaled area at cross-veins.)

Wing Scales of *Theobaldia*.

Plate XI.



Culex ocellatus. ♀. n. sp.



Culex janitor. ♀. n. sp.



Culex azoriensis. ♀. n. sp.



Culex theileri. ♀. n. sp.



Grabhamia sollicitans. ♀. Walker



Grabhamia pygmaea. ♀. n. sp.

Wing Scales of Culicina.

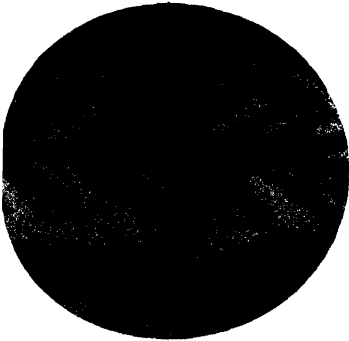
Plate XII.



Culex cylindricus. ♀. n. sp.



Stegomyia nigricephala. ♀. Theo.



Tænorhynchus fulvus. ♀. Wied.



Gilesia aculeata. ♀. n. sp.



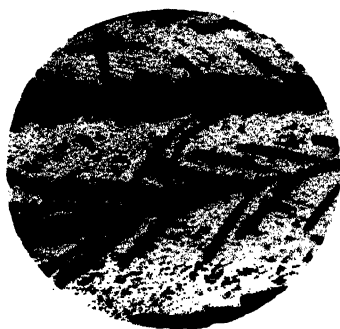
Melanoconion indecorabilis. (♀) n. sp.



Lutzia bigotii. Bellardi.

Wing Scales of Culicina.

Plate XIII.



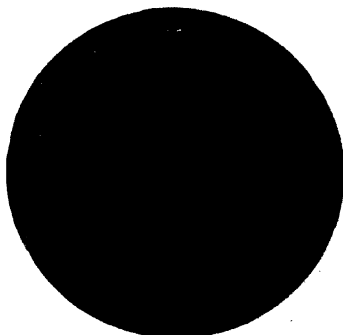
Culex quasigelidus. n. sp. ♀



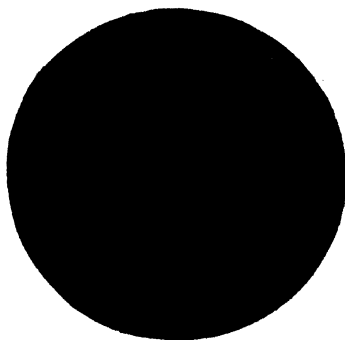
Culex Cumminsi. n. sp. ♀



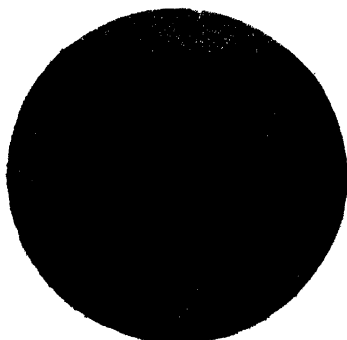
Mansonia major. n. sp. ♀



Acartomyia Zammiti. ♀. n. sp.



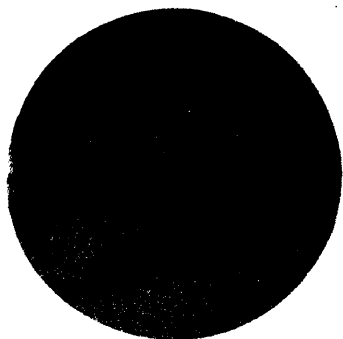
Finlaya polcillipes. n. sp. ♀



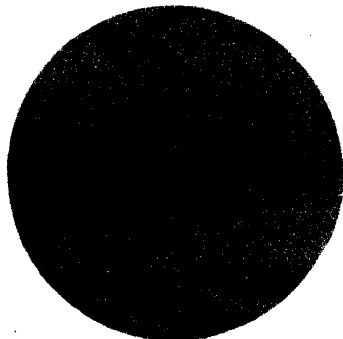
Tænorhynchus fuscopennatus. ♀. n. sp.

Wing Scales of Culicina.

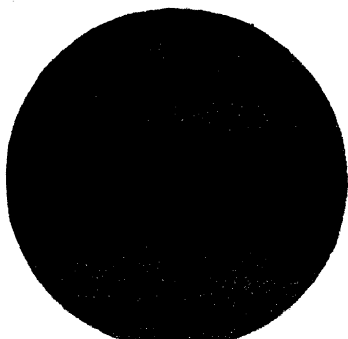
Plate XIV.



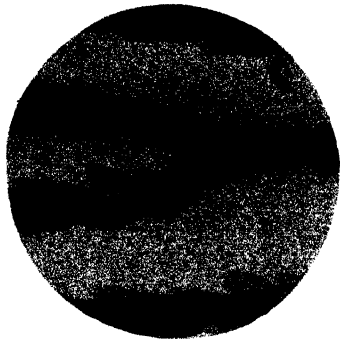
Grabhamia durbanensis. (♀). Theob.



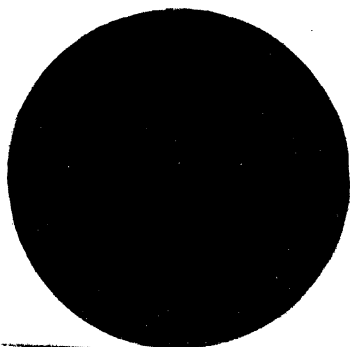
Taeniorhynchus fuscopennatus. (♀). n. sp.



Sabethes remipes. (♂). Wied.



Sabethes remipes. (♀). Wied.



For *Macrorhynchus longirostris*. (♂). Theob. read *Phoniomyia*
longirostris. (♂). Theob.

Plate XV.



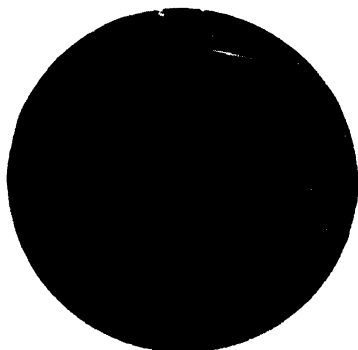
Runchomyia frontosa. n. sp. ♀.



Sabethes ♂



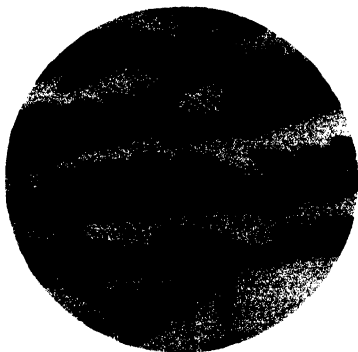
Phonomyia longirostris. ♀. Theob.



Uranotaenia annulata. ♀. Theob.



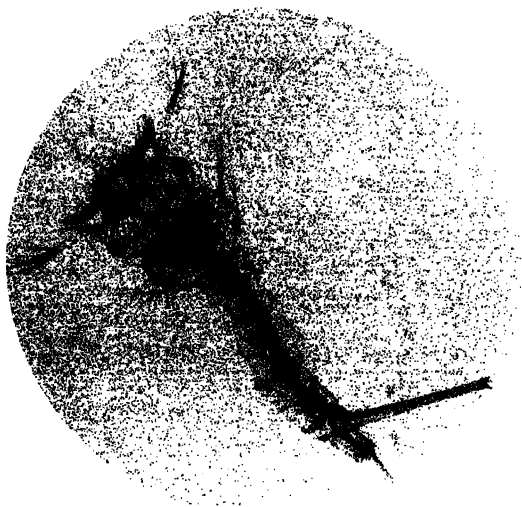
Howardina GreenII. ♀. n. sp.



Dendromyia ulocoma. ♀. n. sp.

Wing Scales of Genera of Aedeomyina.

Plate XVI.



I.



II.

Larva (I.) and pupa (II.) of *Melanoconion atratus*, Theob.

Plate XVII.



Larva of *Desmidea panactros*, Giles, and *D. fusca*, Theobald.

a, Siphon of larva; b, side of thorax; c, antenna of *D. panactros*; d, *D. fusca*—anal plate of larva; e, siphon of *D. fusca*.

